

# SPECIES FILICUM;

BEING DESCRIPTIONS OF THE KNOWN FERNS, PARTICULARLY OF SUCH  
AS EXIST IN THE AUTHOR'S HERBARIUM, OR ARE WITH  
SUFFICIENT ACCURACY DESCRIBED IN WORKS  
TO WHICH HE HAS ACCESS;

ACCOMPANIED WITH NUMEROUS FIGURES:

BY

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VOL. IV.

CONTAINING

SCOLOPENDRIUM—POLYPODIUM.

PLATES CCXI.—CCLXXX.

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## PLATES CCXI—CCLXXX.



## SPECIES FILICUM.

### SUBORD. VII.—SCOLOPENDRIÆ, Pr.

*Sori* as in *Asplenice* (Subord. VI. vol. ii. p. 76), except that the involucre are arranged in pairs, opposite to each other, one originating on the superior side of a veinlet, the other on the inferior side of the opposite veinlet or branch.—*A small group, with one exception, having undivided fronds. Venation free, or more or less anastomosing.*

I have ventured to unite under one genus *Scolopendrium*, Sm., *Antigramme*, Pr., *Camptosorus*, Lk., and *Schaffneria*, Fée. The chief distinctions depend on the nature of the venation, and, certainly, in proportion as the veins anastomose, the sori become scattered and the involucre are not always connivent in pairs, opening face to face. Mettenius excludes the group from *Asplenice*, while Moore incorporates the two.

#### 1. SCOLOPENDRIUM, Sm.

(HOOK. GEN. FIL. TAB. LVII. B. *Antigramme*, Pr.  
HOOK. GEN. FIL. TAB. LVII. A. *Camptosorus*, Link. Hook.  
GEN. FIL. TAB. LVII. C. *Schaffneria*, Fée.)

Character of the genus the same as the Suborder.

§ EUSCOLOPENDRIUM.—*Veins free or occasionally anastomosing.*

1. S. (*Euscolopendrium*) *vulgare*, Sm.; caudex short erect stout scaly as well as the usually short tufted stipites, fronds 6 inches to 2 feet long oblong-strapshaped moderately acute deeply auriculato-cordate at the base, veins close parallel rarely anastomosing.—Sm. *Mém. Acad. Roy. Sc. Tur.* v. p. 421. t. 9. f. 2. *Engl. Bot.* t. 1150. *Hook. et Arn. Brit. Fl.* ed. 8. p. 591. *Hook. Brit. Ferns.* t. 37. *Moore, Brit. Ferns, Nat.*

*Pr. t.* 42. *f.* 1. *S. officinarum*, *Sw. Syn. Fil. p.* 80. *Schk. Fil. p.* 78. *t.* 83. *Willd. Sp. Pl. v. p.* 348. *S. minus*, *Fée, Gen. Fil. p.* 209. *t.* 17 *D. f.* 3. *S. Lingua*, *Palustr. Svensk Bot. ii. t.* 143. *Asplenium Scolopendrium*, *Linn. Sp. Pl.* 1537.—Var. *angustum*; fronds small sublinear. *Scolopendrium Lindenii*, *Hook. Ic. Pl. v. t.* 488.

Hab. Shady banks, woods, etc., throughout Europe, from Scandinavia ("ubi rarissima filix") in the north, to Italy, Greece, Spain, Madeira, and the Azores in the south; the Caucasus and Asia Minor (Nicomedia, *Aucher-Elai*). N. America, State of New York, *Dr. Torrey*, and Lake Onondaga, *Pursh*. A small form is in my herbarium from Chiapas, Mexico, *Lindea*; and I possess fine specimens from Hakodadi, Japan, *Witford*.—A species easily recognized, yet liable to sport and to take peculiar and monstrous forms, especially in a state of cultivation. Rarely sori are found on both sides of a frond (see *Hook. Brit. Ferns*, under *t.* 37).—M. Fée's *S. minus*, from the Pyrenees, is merely a young and dwarf state of *S. vulgare*.

2. *S. (Euscolopendrium) Hemionitis*, *Sw.*; caudex small nodose very scaly, stipites tufted elongated, fronds 4–6 inches long hastato-sagittate, the lobes obtusely angled at the base, sori distant short, veins all free.—*Sw. Syn. Fil. p.* 90. *Cav. Ann. de Cienc. v. p.* 150. *t.* 41. *f.* 2. *Schk. Fil. p.* 79. *t.* 84. *Willd. Sp. Pl. v. p.* 350 (*excl. Aspl. Hemionitis, L.*). *De Cand. Fl. Fr. ii. p.* 522. *S. cordatum*, *Fée, Gen. Fil. p.* 209. *S. sagittatum*, *De Cand. Fl. Fr. v. p.* 238.

Hab. South of France, Italy, Sicily, Spain, Greece, *Heldreich*.—This is a very different species from the *S. vulgare*, and appears to be peculiar to the south of Europe, not extending to any of the opposite coasts of Africa or to the African islands.

3. *S. (Euscolopendrium) pinnatum*, *J. Sm.*; frond ample coriaceous-membranaceous 2–3–4 feet long simple or in age pinnated, pinnæ remote a span long acuminate eroso-crenate the base cuneate and (the uppermost ones) decurrent, terminal pinna the largest its apex proliferous, sori linear-oblique, rachis compresso-alate.—*J. Sm. En. Fil. Philipp. in Hook. Journ. Bot. iii. p.* 406 (*name only*). *Kunze in Schk. Fil. p.* 124. *t.* 56. *S. longifolium*, *Pr. Reliq. Hænk. p.* 48. *t.* 9. *f.* 1 (*young plant with undivided frond*).

Hab. Luzon, *Hænke*; *S. Camarines*, *Cuming, n.* 187, and *Leyte*, 311.—I possess fine specimens of the fronds of this noble species; but neither the caudex nor the perfect stipes. *Hænke* represents the stipes of the young simple-fronded specimens as scandent and creeping.

There has been referred to true *Scolopendrium* the *S. Durvillai* of Bory in *Duperrey, Voy. of the Coquille, Bot. p.* 273. *t.* 37. *f.* 1, which represents a long linear-lanceolate frond, with sori (if sori they are) more like those of a *Gymnogramme* than of *Scolopendrium*; and most imperfectly described. It is from the Pacific island of Ualan, and the caudex is said to be scandent. The same plant

is taken up by Kunze, Sekh. Fil. p. 9. t. 5, where a very different and very abnormal state of the fern is given, with "sori" equally unlike those of a *Scolopendrium*, and which Mr. Smith is disposed to refer to a diseased state of his *Stenochlena scandens*. He is probably right in this conjecture.—Another supposed species of *Scolopendrium*, *S. Krebsii*, Kze., I consider to be a form of our *Lomaria punctulata*, vol. iii. p. 31, where see the observations under that species.

§ ANTIGRAMME.—Veins free at the base, anastomosing towards the margin; fronds costate.

4. *S. (Antigramme) Brasiliense*, Kze.; caudex short erect copiously rooting, fronds a span to a foot long simple oblong-lanceolate more or less acuminate costate entire or only sinuate tapering below into a rather short stipes, sori copious varying in length confined to the free portion of the veins.—Kze. in *Linnea*, xxiii. p. 291. *Asplenium Brasiliense*, Sw. *Vet. Acad. Handl. Stock.* 1817, p. 65. t. 3. f. 1. *Aspl. dubium*, Gaud. in *Freye. Voy. Bot.* p. 314. *Antigramme Brasiliense*, Moore. *Ind. Fil.* p. 78. *Scolopendrium ambiguum*, Raddi, *Fil. Bras.* 40. t. 67. f. 1. *Metten. Fil. Hort. Lips.* p. 67. *S. repandum*, Pr. *Del. Prag.* i. p. 180. *Antigramme repanda*, Pr. *Tent. Pterid.* p. 120. t. 4. f. 9, 10. *Hook. Gen. Fil.* t. 27 A.; *lc. Pl.* t. 2. p. 183. *A. subsessilis*, Fée, *Gen. Fil.* p. 210 (*narrow frond and short stipes*).

Hab. Brazil; most frequent in the south.

5. *S. (Antigramme) Douglasii*, Hook.; caudex (?), stipes as long as or longer than the frond, frond about a span long ovate and acute at the base or cordato-ovate acuminate coriaceous-membranaceous entire or sinuated, sori linear much elongated generally as long as the free portion of the veins.—Hook. *Gen. Fil.* t. 55 A. and t. 57 A. *Asplenium*, Hook. et Grev. *lc. Fil.* t. 150. *Scolopendrium plantagineum*, Schrad. (*vide Pr.*) *Antigramme*, Pr. *Tent. Pterid.* p. 120. *Antigramme populifolia*, Pr. Fée, *Gen. Fil.* p. 210. *Hemidictyon Douglasii*, Pr. *Tent. Pterid.* p. 111.

Hab. Brazil, about Rio, Douglas, Moricand; Organ Mountains, Gardner, n. 148.—This is the finest of the *Scolopendrioid* group. Some of my specimens have the fronds 10 inches long and nearly 5 inches broad; the broadest much resemble a large poplar-leaf.

§ SCHAFFNERIA.—Veins flabellate, free at the base, anastomosing towards the margin; fronds ecostate.

6. *S. (Schaffneria) nigripes*, Hook.; caudex short erect clothed with black subulate scales, stipites tufted short thick ebony-black articulated at the summit, fronds  $1\frac{1}{2}$ – $1\frac{3}{4}$  inch long obovate carnosousubcoriaceous entire ecostate, veins



subflabellate, sori short and in opposite pairs on the free portion of the veins sparse generally solitary among the anastomosing veins.—*Schaffneria nigripes*, *Fée, Foug. Sme Mém. p. 56. t. 17.* *Asplenium* (*Schaffneria*) *nigripes*, *Hook. in Kew Gard. Misc. ix. p. 268. t. 9.*

Hab. Mexico, between Vera Cruz and Orizaba, *Müller, Schaffner*.—The habit of this little plant is very remarkable; but as far as the fructification and venation are concerned, it quite corresponds with *Antigramme* of authors, which I consider a section of *Scolopendrium* rather than as forming a genus distinct from it.

§ CAMPTOSORUS.—Veins anastomosing near the costa, free and forked at the margin. Sori usually in opposite pairs, but more or less divaricating.

7. *S. (Camptosorus) rhizophyllum*, *Hook.*; rhizome small erect or decumbent, stipites tufted 1-3 inches long green, fronds a span and more long flaccid from a broad and deeply cordate base with large rounded lobes gradually tapering to a very long cordate slender almost filiform apex often proliferous at the point, sori short divaricated.—*Asplenium rhizophyllum*, *Linn. Sp. Pl. p. 1536. Sw. Syn. Fil. p. 74. Willd. Sp. Pl. v. p. 305. Mich. Am. ii. p. 64. Hook. Fil. Bor. Am. ii. p. 262. Camptosorus, Link, Fil. Hort. Berol. p. 83. Pr. Tent. Pterid. p. 121. t. 4. f. 8. Hook. Gen. Fil. t. 4. f. 8. Exot. Ferns, t. 85 (excl. syn. *C. Sibiricus*, *Rupr.*). *C. rumicifolius*, *Lk. Fil. Hort. Berol. p. 83. Antigramme, J. Sm. Cat. Cult. Ferns, p. 49. Moore.**

Hab. United States of America, as it would appear, widely dispersed, yet local; "New England to Wisconsin, and southward, rare" (*Asa Gray*). Our herbarium possesses specimens from New York, Vermont, Schuylkill, Wisconsin, Kentucky, Pennsylvania; in British N. America, from Canada to the Saskatchewan, *Gouldie, Drummond*.—A very remarkable plant, which by means of copious plantlets produced from the long slender proliferous apices of the fronds, traverses a good deal of ground, and is known in the United States by the name of the "Walking-leaf."

8. *S. (Camptosorus) Sibiricum*, *Hook.*; caudex small ascending, stipites 3-4 inches long slender tufted, fronds very membranaceous flaccid, sterile ones short oblong-ovate acuminate, fertile ones 5-6 inches long from a lanceolate acute base very long and caudately attenuated rooting at the apex, sori rather short sometimes solitary.—*Hook. in 2nd Cent. of Ferns, t. 35 (where for "Hook. Sp. Fil. iii. ined.," read iv. p. 4).* *Camptosorus Sibiricus, "Rupr. in Beitr. 2. Pflanzenk. d. Russ. iii. p. 45." Ledeb. Fl. Ross. iv. p. 523.*

Hab. Siberia, River Angura, *Steller. Kamtschatka, Georgi.* Island of Tsus Sima, Strait of Korea, *Wilford, n. 790.*—A rare and very little-known species. Our collector, Mr. Wilford, secured only one specimen, which quite accords with

the description of the Russian botanists. Linnæus had probably this plant in view, when he gives his *Aspl. rhizophyllum* as a native of Siberia.

### SUBORD. VIII.—ASPIDIACEÆ, Pr.

*Sori* dorsal, subglobose, rarely elliptical. *Involucre* superior, orbicular and fixed by the centre (peltate), or cordate or reniform and fixed by the sinus, or elliptical and attached by a longitudinal receptacle; the margins free all round or nearly so.—Ferns *very various in habit*; veins *free or variously anastomosing*.

The genera I am disposed to admit under this Order are as follows:—1. DIDYMOCHLÆNA. 2. ASPIDIUM, mainly distinguished by its more or less orbicular peltate involucre, with the following sections or subgenera:—§ POLYSTICHUM, § CYCLODIUM, § CYRTOMIUM, § EUASPIDIUM, next to which I am disposed to place § SAGENIA. 3. NEPHRODIUM, *Rich. and Br.*, chiefly distinguished by its cordate or reniform involucre, fixed at the sinus. Subgenera. § LASTREA, *with free veins*. § EUNEPHRODIUM, *with connivent veins*, including PLEOCNEMIA. 4. NEPHROLEPIS. 5. OLEANDRA. 6. FADYENIA. 8. ONOCLEA. It is true a synopsis of their character is not to be given a few words; but they appear to me to have sufficient marks of distinction natural or artificial.

#### 1. DIDYMOCHLÆNA, Desv.

(HOOK. GEN. FIL. TAB. VIII.)

*Sori* dorsal, terminal on a veinlet, elliptical. *Involucre* elliptical, emarginate at the base, attached by a longitudinal receptacle, free all round at the margin. *Veins* subflabellate, several times forked, free, the apices of the veinlets clavate.—Caudex *erect, stout, arboreous*. Fronds *tufted, terminal, 4-6 feet long, stipitate, erecto-patent, subcoriaceous, bipinnate*. Pinnules  $\frac{3}{4}$ –1 inch long, obliquely rhomboid. *Sori submarginal mostly on the superior half of the pinnule*.

1. *D. lunulata*, Desv. in Mém. Soc. Linn. vi. p. 282. Hook. Gard. Ferns, pl. 17. *D. sinuosa*, Desv. l. c. p. 28. Mart. Ic. Pl. Crypt. Bras. p. 95. t. 28 and 29. f. 1. Hook. Gen. Fil. t. 8. *D. squamata*, Desv. Journ. Bot. Appl. i. p. 5. t. 2. f. 4. *D. truncatula*, J. Sm. Gen. of Ferns, p. 84. *D. dimidiata*, Kunze in Linnæa, xviii. p. 122. Schk. Fil. Suppl. p. 200. t. 84. Pappe and Raws. Syn. Fil. Afr. p. 15. *Aspidium truncatulum*, Sw. Syn. Fil. pp. 52 and 252. Willd. Sp. Pl. v. p. 256. *Aspid. squamatum*, Willd. Sp. Pl. v. p. 250. *Monochlæna sinuosa*, Gaudich. in Freyc. Voy. Bot. p. 340. t. 12. f. 3. *Diplazium pulcherrimum*, Raddi, Fil. Bras. p. 42. t. 59. *Lonchitis ramosa*, etc., Plum. Fil. p. 43. t. 56.



Hab. Tropical America; Brazil, N. Granada, Andes of Ecuador and Peru, West Indian islands. East Indies; Java, Luzon. S. Africa; Natal. Madagascar, *Goudot*. Peak of Fernando Po, *G. Mann*. Fiji Islands, *Milne*, *Brackenridge*.

## 2. ASPIDIUM, Sw. (in part), Br.

(HOOK. GEN. FIL. TAB. XXXIII. *Tectaria*, Cav. *Bathmium*, Pr. *Podopeltis*, Fée. *Proferea*, Pr. *Cyrtomium*, Pr. HOOK. GEN. FIL. TAB. XLIX. C. *Cyclodium*, Pr. HOOK. GEN. FIL. TAB. XLIX. B. *Phanerophlebia*, Pr. HOOK. GEN. FIL. TAB. XLIX. A. *Polystichum*, Schott. HOOK. GEN. FIL. TAB. XLVIII. C. *Hypopeltis*, Rich. *Hemigonium*, J. Sm. *Hemicardium*, Fée. *Rumohria*, Raddi. *Peltochlæna*, Fée.)

*Sori* dorsal, subglobose, involucrate. *Involucre* orbicular or nearly so, peltate (fixed by the centre), on the back of free veins, or terminal, sometimes on the back or junction of reticulated veins (then called compital). *Veins* free, acute at the apex, or variously anastomosing.—Ferns very various in form and size and composition, inhabiting both the tropical and temperate parts of the world. *Caudex* also very variable, erect and stout, or ascendent, or long and creeping.

An extensive genus, even as it now stands reduced, mainly distinguished by the nearly globose sori and the orbicular and peltate involucre. I follow mainly the views of Richard in Michaux, Brown, and Desvaux, in maintaining the genera *Aspidium* and *Nephrodium* as thus limited, and I make use of the venation for the sections or subgenera. Entire dependence is not however to be placed either on the exact uniformity of the venation, nor even on the shape of the involucre. These latter do occasionally vary, sometimes orbicular sometimes cordate on the same species, and sometimes the form and the point of insertion seem to be intermediate between the two.

§ POLYSTICHUM.—*Veins* simple or pinnated or variously dichotomous, free. *Sori* generally dorsal. *Pinnæ* and *pinnules* usually rigid and spinuloso-serrate.

\* *Frond* simple, more or less lobed.

1. A. (Polystichum) *glandulosum*, Hook. and Grev.; caudex very small scaly, stipites very short scarcely  $\frac{1}{2}$  inch long paleaceous, fronds tufted a span long submembranaceous broad-lanceolate tapering below subpellucid glanduloso-pilose deeply nearly to the base pinnatifid (lowest segments sometimes free), segments oblong-lanceolate obtuse entire or sublobate at the margin superior base obscurely auricled inferior sub-excised and decurrent, sori in two series mostly towards the apex.—Hook. et Grev.  *Ic. Fil. t. 140, not Blume*. *Polystichum*?, Pr. *Aspidium viscidulum*, Metten. *Aspid. p. 38*.

Hab. Jamaica, *Dr. Bancroft*; above the old Botanic Garden, rare, when fresh-gathered very viscid, *Purdie*. Cuba, east side of the island, *C. Wright*, n. 1052.

—A most distinct and well defined, apparently exceedingly rare species, and for a long time supposed to be peculiar to Jamaica. Recently I have received beautiful specimens from Mr. C. Wright, gathered in Cuba.

2. A. (Polystichum) *Plaschnichianum*, Kze. ; caudex small erect, stipites tufted slender laxly paleaceous 4-6 inches long, fronds from a broad cuneate base lanceolate gradually acuminate 4-5 inches long rooting at the obtuse apex subcoriaceous entire cuneate at the base or more or less pinnatifid with the lobes rounded subcrenate rarely with the lowest pair free sessile and decurrent, sori scattered or in two series one on each side the costa (TAB. CCXI).—Kze. in *Linnea*, xxiii. p. 302.

Hab. Jamaica, *Wilson* ; wet shady places, St. George's parish, *Purdie*.—This is a very rare plant, only known to the author, Kunze, by a solitary cultivated specimen. I have been more fortunate in possessing specimens direct from Jamaica. It is the most simple-fronded of all the *Polystichum* group of *Aspidium*, and is certainly naturally nearly allied to *A. rhizophyllum*, L., but truly distinct (see our No. 3). The veins are fascicled, and we have seen some veinlets anastomosing, the superior one soriferous.

\*\* *Fronds pinnate, or subbipinnate ; pinnae often deeply pinnatifid.*

3. A. (Polystichum) *rhizophyllum*, Sw. ; caudex small almost none copiously fibrous, stipites tufted  $\frac{1}{2}$  an inch to 2 inches long paleaceous, fronds spreading 3-6-7 inches long submembranaceous lanceolate pinnated, pinnae 6-8 pairs oval or suborbicular nearly entire superior ones coadunate and terminating in a longer very gradually and finely attenuated extremity often proliferous at the narrow point, sori irregularly scattered, rachis winged.—*Sw. Syn. Fil.* p. 44. *Willd. Sp. Pl.* v. p. 219. *Hook. et Grev. Ic. Fil.* t. 59. Polypod. *Sw. Prodr.* p. 132. Nephrod. *Pr. Reliq. Haenk.* p. 31. Polyst. *Pr. Tent. Pterid.* p. 82. Asp. reptans, var. 3. radicans, *Metten. Aspid.* p. 99, *side specim. Paep.*

Hab. Jamaica, *Wiles, Wilson, Purdie* ; Cuba, *Paepig*.—This, with much the general habit and proliferous apex of *A. Plaschnichianum*, may at once be known by its smaller size, thinner frond, the lower half or more pinnate, with the pinnae often petiolate and by the very long and finely attenuated ultimate pinna.

4. A. (Polystichum) *Thomsoni*, Hook. ; caudex short thick scaly, stipites tufted 1-3-4 inches long paleaceous with large scales, fronds 6-8 inches long lanceolate acuminate chartaceo-membranaceous pinnate, pinnae subsessile 3-4 inches long deltoid-ovate or semiovate acute subauricled and deeply pinnatifid (especially at the superior margin), lobes small ovate inciso-serrate, teeth setoso-spinulose, sori solitary on each

lobe, involucre subovate membranaceous peltate pedicellate, the margin suberose.—*Hook. 2nd Cent. of Ferns. t. 25.*

Hab. Sikkim-Himalaya, *Hooker fil. and Thomson*. Kumaon, elevation 9–13,000 feet, *Strachey and Winterbottom*. Simla, *Col. Bates*.—This will rank among the smallest of the *Polystichums*, approaching perhaps nearest to some small forms of *Aspid. Prescottianum*, Wall., among the bipinnate species. The involucre, if constant in structure, is very remarkable.

5. A. (*Polystichum*) *Lachenense*, Hook.; caudex short oblique stout scaly above, stipites very densely tufted numerous and compact stout marcescent 2–4 inches long subflexuose glossy black or dark brown scaly, fronds 4–8 inches long linear-lanceolate coriaceous pinnate, pinnæ, the largest less than  $\frac{1}{2}$  an inch long, patent rather distant sessile deltoideo-ovate subpinnatifido-crenate rather obtuse subpinuloso-serrate or unarmed, sori in two rows on each pinnule, rachis stramineous setaceo-paleaceous with whitish appressed scales (TAB. CCXII.).

Hab. Sikkim-Himalaya, elev. 13–16,000 feet; Lachen and elsewhere, *Hooker fil. and Thomson*.—This has all the appearance of a very alpine Fern. The fronds, and consequently the stipites are very densely tufted, and though most of the fronds seem unable to bear the severity of the winter's cold or the long covering of snow, the stipites remain, stout, black, glossy, and withered at the points. It wants the wiry habit of *Asplenium Trichomanes*, otherwise the general size and form of the pinnules are not much unlike those of a form of that species.

6. A. (*Polystichum*) *Lonchitis*, Sw.; caudex short stout oblique densely paleaceous as are the short stipites and lower portion of the rachis with ferruginous large scales, fronds 6–18 inches long densely tufted erect rigid lanceolate tapering at both ends pinnated, pinnæ numerous approximate from a broad nearly sessile obliquely truncated base ovate or lanceolate falcate acute rather than acuminate spinuloso-serrate, the superior base truncated and auriculate, sori confined to the upper portion of the frond in two or more series upon the pinnæ.—*Sw. Syn. Fil. p. 43. Willd. Sp. Pl. v. p. 224. Sm. Fil. Brit. p. 1118. Engl. Fl. iv. p. 284. Schk. Fil. p. 29. f. 29. Metten. Aspid. p. 41. Hook. et Arn. Brit. Fl. ed. 8. p. 582. Hook. Brit. Ferns. t. 9. Polypodium, Linn. Sp. Pl. p. 1548. Engl. Bot. t. 796. Polystichum, Roth, Fl. Germ. iii. p. 71. Presl. Moore, Brit. Ferns, Nat. Print. t. 9.*

Hab. Abundant in the temperate and cooler parts of Europe, chiefly on the elevated mountains in the south, and it appears to have an extensive range generally in the northern hemisphere, from Greenland (*Disco, Dr. Lyall*) in the north to Switzerland, Spain, Portugal, and Italy, Greece (Mount Olympus, *Aucher-*

*Eloi*), in the south. Eastward we possess it from Davuria (*Turczaninov*), and a decided specimen of the species, gathered by *Jacquemont* in N. W. India, among Birch, on high mountains, at Pye Pundo. In the New World, the only localities recorded are, Michigan, U. States, and Lake Superior (*Dr. Asa Gray*); East side of Rocky Mountains. B. N. America, apparently rare, *Drummond*; and I have recently received, from British Columbia, splendid specimens 2 feet long, gathered by *Dr. Lyall*, of the Oregon Boundary Commission, at the Cascade Mountains, 49° n. lat., at 5000–6000 ft. elev. above the sea.—This species is the least variable of all the *Polystichums*.

7. A. (*Polystichum*) *mucronatum*, Sw.; caudex short thick, stipites 3 inches to a span long densely paleaceous with long lanceolate fulvous scales mixed with equally long subulate ones, those at the base intense ebeneous-black, rachis also stout straight densely setoso-paleaceous, fronds 1–1½ inch long lanceolate coriaceous attenuated at both extremities densely crowded with horizontal pinnæ 1–1½ inch long petiolate lanceolato-falcate mucronate truncated and sharply auriculate and mucronate at the base above, the margins nearly entire or obtusely serrated often villous beneath, sori numerous in two approximate series, involucre firm, generally black with a deep central depression. (TAB. CCXVI.) —Sw. *Syn. Fil.* t. 43. Willd. *Sp. Pl.* v. p. 225. Schk. *Fil.* p. 30. t. 29 C. Griseb. *Pl. Carib.* p. 137. Metten. *Aspid.* p. 41. P. falcatum, Fée, *Gen.* p. 279? Polypodium, Sw. *Fil. Ind. Occ.* iii. p. 1649. Sloane, *Jam.* i. p. 82. t. 36. f. 4, 5.

Hab. Jamaica, Swartz, Bancroft, Wiles, March, Wilson, Purdie; Port Royal Mountains, Hartweg, n. 1584. St. Domingo (Metténus). Guadeloupe (Grisebach). —A well-marked species among the truly pinnated group of *Polystichum*, recognized by the stout and very strict stipites, with their dense clothing of two or indeed three kinds of scales, the copious setaceous-paleaceous rachis, pinnæ villous beneath, and the singular form and colour of the involucre.

8. A. (*Polystichum*) *acrostichoides*, Sw.; caudex short stout or nearly so densely paleaceous, stipites a span long and as well as the rachis stramineous more or less paleaceous, fronds 1½ inch and more long subcoriaceous bright green, pinnæ horizontal rather distant petiolate 2–3 inches long straight or subfalcate, from a broad obliquely cuneated base truncated and sharply auricled above oblong acute mucronate, serratures setoso-pinulose, fertile pinnæ occupying more or less of the upper and contracted portion of the frond reduced in size from ½–1 inch long of the same shape as the sterile ones, sori in 2–4 rows near the costa, eventually confluent and covering the whole back of the pinnæ. —Sw. *Syn. Fil.* p. 44. Willd. *Sp. Pl.* v. p. 225. *Aspid. auriculatum*, Schk. *Fil.* p. 31. t. 30. *Nephrodium acrostichoides*,

*Mich. Am.* ii. p. 267. *Polystichum*, *Roth*, *Pr. A. Gray*, *Man. of Bot. Illustr.* p. 599.—*Var. incisum*; all the pinnules lobato-incised (rather a monstrosity than a variety). *Asa Gray*, *l. c.* *Aspid.* *Schweinitzii*, *Beck.*

Hab. N. America, from Canada to the Rocky Mountains, southward through the United States, and along the Alleghanies, and from Florida westward to the Mississippi.—A species well distinguished by its always contracted fertile pinnæ when the sori are copious, less so when the fructification is partial.

9. A. (*Polystichum*) *munifolium*, Klfs.; caudex short thick erect densely paleaceous with large scaly ferruginous glossy satiny lanceolato-subulate scales, stipites cæspitose a span or more long stramineous, below clothed with similar scales to the caudex, smaller ones above and which are generally continued through the rachis, fronds  $1\frac{1}{2}$  inch and more long, broad-lanceolate acuminate subcoriaceous pinnate, pinnæ numerous horizontal 2–6 inches long from a broad nearly sessile obliquely cuneate base truncate and auricled above narrow-oblong much acuminate straight or falcate mucronate serrated more or less coarsely, serratures setoso-spinulose, sori in one or rarely two rows on each side the costa, involucre at first convex nearly entire depressed in the centre and there darker coloured. (TAB. CCXIX.)—*Kaulf. En. Fil.* p. 230. *Hook. et Arn. Bot. of Beech. Voy.* p. 162. *Hook. Fil. Bor. Am.* ii. p. 261. *Brack. Fil. U. S. Expl. Exped.* p. 203. *Polystichum*, *Pr.* *Nephrodium Plumula*, *Pr. Reliq. Hænk.* P. *falcinellum*, *β.* *Moore.*

Hab. California, *Chamisso*; from Monterey in the south, *Wm. Lobb*, through Oregon Territory, *Menzies*, to Nutka in the north, *Scutler*, *Dr. Guirauder*, *Beechey*, *Bridges*, n. 303, *Dr. J. M. Bigelow*, *Hartweg*, n. 2040, *Geyer* (*Nez Percé* Mountains), *Dr. Sinclair*, *Dr. Lyall*, *Douglas* (who observes that the roots are roasted by the Indians and form an article of food, and that they are used as garlands by them). Well distinguished from *Aspid. falcinellum* by the colour and texture of the scales, by the less coriaceous, less opaque, and broader and more acuminate pinnules, and by their setoso-spinulose serratures.

10. A. (*Polystichum*) *falcinellum*, Sw.; caudex short thick densely paleaceous with very ovate or lanceolate falcate black-brown glossy finely acuminate scales continued up the tufted stipites which are a span and more long, fronds 1–2 inches long broad-lanceolate or oblong acuminate coriaceous pinnate, pinnæ horizontal subfalcato-ensiform petiolate 2–3 inches long sharply (not spinulose) serrated, the superior base truncate and auricled, inferior base excised rarely auricled above, sori biserial between the costa and margin, involucre orbicular almost cup-shaped fringed at the margin with a dark



umbo in the centre.—*Sw. Syn. Fil. pp. 46 and 243. Willd. Sp. Pl. v. p. 233. Lowe, Prim. Fl. et Faun. Mad. p. 5. Hook. Niger Fl. p. 83. Metten. Aspid. p. 42. Hook. Fil. Exot. t. 53. Polystichum, Pr.—β. subhastatum; pinnæ auricled on both sides at the base. Hook. l. c.*

*Hab.* Madeira; summits of the mountains, especially in cool shady places, *Masson, Lowe; Ribeiro Frio and Curral, Vogel, Lippold, Lemann, J. D. Hooker.*—*Var. β.* North side of Paul de Serra, near 5000 feet elev.; *Lowe in Herb. Nostr., Lemann.*—This Fern was long mistaken for the Ceylon *A. auriculatum*, till the Rev. Thos. Lowe cleared up all the difficulties respecting it. It is also allied to the two North American species, *A. acrostichoides* and *A. minutum*.

11. *A. (Polystichum) auriculatum*, Sw. ?; caudex short thick erect or oblique more or less copiously scaly, stipites brown or stramineous 4 inches to a span long more or less paleaceous as is the rachis, fronds  $\frac{1}{2}$  a foot to 2 feet long oblong- or broad-lanceolate pinnated submembranaceous or coriaceous, pinnæ horizontal varying much in size and form 1–3 inches in length sessile or nearly so, in the normal state from a broad cuneate base truncated and sharply auricled above excised beneath falcato-lanceolate acuminate subentire or serrated especially on the upper margin and towards the apex unarmed, or varying extremely in length and breadth and becoming more or less pinnatifid with the segments or lobes or teeth variously spinulose often deeply pinnatifid and even again pinnate at their base, sori in two rows nearer the margin than the costa, involucre very fugacious brown membranaceous.—Normal form: pinnæ submembranaceous nearly entire at the margin or serrated, teeth rarely spinulose. (TAB. CCXVIII.)—*Sw. Syn. Fil. p. 44? (excl. syn. Schk.). Willd. Sp. Pl. v. p. 227. Metten. Aspid. p. 40. Polypodium, Linn. Sp. Pl. p. 1548. Fil. Zeyl. p. 383. Filix Zeylanica, etc., Burm. Zeyl. p. 94. t. 44. f. 2.*—*Var. coriaceum; pinnæ coriaceous broad the margin more or less strongly lobed or serrated and spinulose, fronds sometimes viviparous at the apex.*—*A. marginatum* (auricle sometimes free), *Wall. Cat. n. 366. Metten. Asplen. p. 59.*—*Var. subbipinnata; pinnæ subcoriaceous variously and deeply lobed and toothed, below frequently again pinnated, the lobes and pinnules spinulose (thus bordering upon A. aculeatum, var. lobatum).*—*A. ocellatum, Wall. Cat. n. 98. A. lentum, Don, Syn. Nep. p. 4.*

*Hab.* India. Normal form; abundant in Ceylon and the Madras Peninsula, *Burmah, Wallich, Gardner, Thwaites, Wight, etc.*, less common in other parts of India; *Khasya, Hook. fil. and Thomson; Bhotan, Griffith*, and there more fre-

quently assuming other forms.—Var. *coriacea*. Nepal, Kumaon, *Wallich*, elev. 9000 ft., Devali, *Strachey and Winterbottom*; above Simla, *Col. Bates, Edgworth*; Sikkim-Himalaya, *Hook. fil. and Thomson* (some with the lower scales on the stipes larger and intensely black); Bhotan, 9000 ft., *Griffith, Booth*.—Var. *subbipinnatum*, Nepal, *Wallich*, n. 360; Kumaon, elev. 2500 ft., *Strachey and Winterbottom*. Khasya, *Griffith, Hook. fil. and Thomson*, often mixed with the true *auriculatum*, *Thos. Lobb*; N. W. Himalaya, Harabagh, *Edgworth*.—The earliest certain authority for this little-understood but common Indian Fern, is Burmann's figure above quoted; and that, though only exhibiting the apex of a frond, is so characteristic, that we feel confident of its identity with the normal state we have here figured, and which is particularly common in Ceylon and the adjacent Madras Peninsula, where it seems to be pretty constant to its type; but in the Bengal Presidency, Northern Provinces, it is so variable that we do not wonder Dr. Wallich and others constituted new species. The difficulty indeed is to know where to stop, for in several the fronds become more compound, more or less bipinnate to an extent which almost unites our original type with *Aspid. aculeatum*, especially the least compound state of that, the var. *lobatum*.

12. A. (*Polystichum*) *lepidocaulon*, Hook.; stipites 6–9 inches and as well as the rachis densely clothed with brown membranaceous broad ovate scales of two kinds the one small and appressed the other large and more or less spreading, fronds 8–10 inches long ovate acuminate broad and truncated at the base pinnated, pinnæ not numerous (10–12 pairs) chartaceous 2–2½ inches long sessile or shortly petiolate from a broad cuneate base truncated and distinctly and sharply auricled above, lanceolate gradually acuminate scaly beneath entire or obscurely crenate the inferior base rounded, uppermost pinnæ short and confluent into an acuminate pinnatifid apex, sori in two or more series near the costa, involucre brown membranaceous deciduous, veins fascicled rarely here and there anastomosing. (TAB. CCXVII.)

Hab. Near Simoda, Japan, *J. Small*; *Ringgold and Rogers*, U. S. N. Pacif. *Expl. Exped.* (from the herbarium collected by *C. Wright*). Tsus Sima, Strait of Corea, *Wilford*.—A very distinct and well marked species, with a habit and texture somewhat approaching narrow pinnated forms of *Cyrtium falcatum*; but with the almost entirely free venation of true *Polystichum*. The two sets of broad scales copiously clothing the rachis as well as the stipes, and less numerous on the under side of the pinnæ are very peculiar.

13. A. (*Polystichum*) *stimulans*, Kze.; caudex short stout oblique very scaly, stipites densely tufted 2–4 inches long often chaffy flexuose slender and tawny as is the rachis, fronds subcoriaceous 4–6–8 inches long linear or oblong-lanceolate acute pinnate, pinnæ lax distant distinctly petiolate from an oblique truncate cuneate base rhomboideo-triangular with generally a spinose auricle at each base and with two or three large sharp serratures which as well as the apex are terminated with a spine, rarely one of the auricles becomes a free

pinnule, sori few in two rows one on each side of the costules. (TAB. CCXIV.)—*Kze. Herb. fide Metten. Aspid. p. 43.* Polystichum, *Pr. Tent. Pterid. p. 83.* Aspid. pungens, *Wall. Cat. n. 368 (not Klfs.).* Aspid. ilicifolium, *Don, Prodr. Nep. p. 3 (not Fée).* Aspid. sagittatum, *Jacquem. MSS. in Herb. Mus. Paris and Herb. Nostr.*

Hab. Northern India; Nepal and Kumaon, *Wallich, Strachey and Winterbottom*, elev. 9000 feet; Simla, *Col. Bates*. N. W. India, *Edgworth*; Valley of the Jumna, 9-1000 feet elev., *Jacquemont*, n. 74, 75. Sikkim, Changtam, Tambur river, *Hook. fil. and Thomson*.—This has a lax and flexuose habit not common among genuine *Polysticha*: and, taking the more ordinary forms, such as we have represented in our Plate CCXIV., it seems very distinct; but even in this state it has its representative, especially in the peculiar triangular shape of the pinnae, in the West Indies, in the *Aspid. triangulum*, Sw., figured at t. 33 of our 'Filices Exoticæ'; there however the frond is more coriaceous, the pinnae are less spinoso-lobate and sessile, and the scales of the caudex and lower part of stipes are very different, large, and with a deep glossy black disk. Again, some of our specimens from Mr. Edgworth and from Sikkim, have the pinnae more elongated, more pinnatifid, and more disposed to be bipinnate. In our ordinary form we here and there find a pinna which bears a distinct pinnule.

14. A. (Polystichum) *diaphanum*, Zoll.; "frond thin-membranaceous subpellucid flaccid ferrugineo-pilose on the nerves oblong-lanceolate acuminate pinnato-subpinnatifid, pinnae shortly petiolate approximate divergent or patulous trapezio-ovate oblong auriculate obtuse, the adult plant at the base (partly only deeply pinnatifid) with the auricle free, segments obliquely ovate lobed or toothed all of them obsoletely costate aristato-serrate or toothed, sori at the base of the laminae or of the lobes or teeth solitary, of the lower ones and of the auricle binate or quaternate subrotund with lax capsules, petiole rachis short stipes and rhizome densely ferrugineo-paleaceous." *Kze. in Bot. Zeit. vi. p. 260. Metten. Aspid. p. 42.*

Hab. Java, *Zollinger*, m. 330.—Mettenius places this in the same subsection with *Aspid. stimulans* and *A. ocellatum*, Wall. (our *A. auriculatum*, var.). I am not acquainted with it. Kunze says that in habit it resembles *Polypodium reptans*, Sw. (*Aspidium*, *Metten.*).

15. A. (Polystichum) *cæspitosum*, Wall.; caudex a short thick scaly rhizome, scales often ciliated, stipites tufted slender 2-6 inches long stramineous as well as the rachis, fronds 4 inches to a span and more long oblong- or linear-lanceolate acute rather than acuminate chartaceo-membranaceous often glossy pinnated, pinnae rather distant horizontal  $\frac{1}{2}$ -1 $\frac{1}{4}$  inch long petiolate from an entire obliquely cuneate truncate and obtusely auricled, superior base trapezoido-



ovate obtuse or acute sharply but scarcely mucronato-serate, inferior base incised, sori uniseriate on the pinnæ and the auricles between the costa and the margin, involucre peltate ciliate at length deciduous. (TAB. CCXIII.)—*Wall. Cat. n. 367. Metten. Aspid. p. 367. Polystichum, Schott. Pr. Aspidium obliquum, Don, Nepal. p. 43. (fide Moore).*

Hab. Northern India, especially in the Himalaya, at elevation of 4-10,000 feet. Nepal, *Wallich*. North-west Provinces, *Edgeworth*. Simla, *Col. Bates*. Kumaon, *Strachey and Winterbottom*; Lachen and Sikkim, *Hook. fil. and Thomson*. Bhotan, *Griffith*.—This has, I think, sufficiently marked characters to merit rank as a species, and my specimens exhibit few variations.

16. A. (Polystichum) *triangulum*, Sw.; caudex short stout erect or oblique clothed above with large intensely black glossy brown-margined scales, stipites tufted from an inch to a span long fusco-paleaceous, rachis straight or flexuose, fronds coriaceous lanceolate gradually acuminate pinnate, pinnæ often distant rhombic-ovate subfalcate lower ones triangular, the apex and distinct auricle generally on each side at the base spinose, the margins thickened sinuato-dentate, sori in 2 rows and more or less extending to the auricles.—*Sw. Syn. Fil. p. 14 (excl. syn. Schk.). Willd. Sp. Pl. v. p. 226. Hook. Fil. Exot. t. 33. Metten. Aspid. p. 40. Polystichum, Fée. Polyst. mucronatum, J. Sm. Cat. Cult. Ferns, p. 60 (not Sw.). Polypodium triangulum, Linn. Sp. Pl. p. 1549. Polystichum cyphochlamys, Fée, Gen. Fil. p. 269; Gme Mém. Foug. p. 20. t. 3. f. 4. Lonchitis folio triangulari, Plum. Fil. t. 72? (possibly intended for mucronatum). Trichomanes majus, etc., Sloane, Jam. i. p. 81. t. 30. f. 4.— $\beta$ . *laxum*; fronds elongate lax, rachis sometimes proliferous at the apex, pinnæ remote shorter more lobato-spinose. Polystichum ilicifolium, Fée, Gen. Fil. p. 279; Gme Mém. Foug. p. 21. t. 6. f. 4 (not Don).— $\gamma$ . larger and stronger, pinnæ more elongated sublanceolate lobato-subpinnatifid, lobes all spinose. A. *trapezioides*, Sw. Syn. Fil. p. 44?*

Hab. Jamaica, *Sloane, Purdie* (Cedar Valley, St. George), *N. Wilson, Dr. Alex. Prior*. Cuba, *Linden*, n. 2175 (Fée), n. 1866 (in *Herb. Nostr.*).—Var.  $\beta$ . St. Jago de Cuba, *Linden*, n. 2193 (Fée), *C. Wright, Pl. Cub. n. 829*.—I must refer to my figure of this species, in 'Filices Exoticae,' and to my description and remarks, for my reasons for uniting Fée's *Polyst. cyphochlamys* and his *P. ilicifolium* with it. I have seen no authentic specimen of the true *trapezioides*, Sw., but suspect it to be the same as this.

17. A. (Polystichum) *viviparum*, Fée; "fronds below bipinnate, above pinnate virgate radicante-viviparous, rachis stout channelled rufescent, scales lanceolate acuminate black

in the centre, pinnæ obtuse, lower ones pinnate at the base segments mucronate, mucro short thick, upper pinnæ sub-rhomboid auricled above crenulate mucronate at the apex." *Polystichum viviparum*, Fée, *Gen. Fil. p.* 280; *6me Mém. Foug. p.* 21. *t.* 3. *f.* 3. *Aspid. Metten. Aspid. p.* 44. *P. trapezoides*,  $\beta$ , Moore, *Ind. Fil. p.* 108 (*name only*).

Hab. Cuba, Linden, n. 1742. Jamaica, Purdie.—I had occasion to remark in the 'Filices Exotice,' under *Aspid.* (*Polystichum*) *triangulum*, Sw., that it would be no enviable task for any one to undertake to describe the different exotic kinds of the *Polystichum*-group of *Aspidium*. I now feel very sensibly the truth of that statement. M. Fée has given a faithful representation of this Fern, and I have copied his correct specific character; but different as this form assuredly is from the ordinary form of *Aspid. triangulum*, my var.  $\gamma$ , I am quite disposed to consider it as an intermediate state; in short, passing by its more compound (partially bipinnate) into the ubiquitous and polymorphous *Aspid. aculeatum*. (See observations on a form of our *Aspidium aculeatum*, under the S. American (West Indian) localities from Cuba.) Mr. Moore refers Fée's *viviparum* to his *P. trapezioides*; but what his *trapezioides* is we are not informed. The specimen which I believe to be Swartz's *trapezioides*, he has, and rightly too, referred to *triangulum*.

18. A. (*Polystichum*) *tridens*, Moore, MSS.; caudex short erect clothed with conspicuous intensely ebeneous-black scales with brown margins often ciliated, stipites 3-6 inches long tufted fusco-paleaceous below, fronds 6-12 inches long oblong-lanceolate coriaceous acuminate, pinnæ 1 inch long deeply tripartite (rarely trifoliolate) the cuneate base tapering into a petiole, segments (or pinnules) linear-lanceolate acuminate spinulose the margin subspinuloso-serrate, uppermost pinnules linear-lanceolate and nearly entire, veins almost obsolete, sori in two rows submarginal, involucre peltate pedicellate fringed. (TAB. CCXV.)—*Polystichum tridens*, Moore, *MS. in Herb. Hook.*

Hab. Jamaica, rare; near Woburn Lawn, Port Royal, Purdie, 1840. Arntilly Gap, Blue Mountains, elev. 3000 ft., Wilson.—Unwilling as I am to sanction a specific name written in a private herbarium, without any character or description, the present one is too appropriate to be rejected. It will be seen by our figure, how extremely unlike it is to any known *Polystichum*; yet upon one of my specimens of *P. triangulum*,  $\beta$ , a considerable number of pinnæ are regularly trifurcate, though broader and shorter than these. I cannot think it possible it can be an abnormal form of that variable plant. My several specimens of this, indeed, from two different collectors are very uniform.

19. A. (*Polystichum*) *tripteron*, Kze.; caudex short erect paleaceous with brown ovate scales, stipites tufted a span to a foot high scaly below and as well as the rachis stramineous glossy, fronds 1-1½ foot long submembranaceous flaccid

hastato-lanceolate acuminate pinnate, the lowest pair of pinnæ elongated 4-6 inches long and again pinnate, pinnæ and pinnales all horizontal subsessile from a broad obliquely cuneated base auricled above subexcised below lanceolate inciso-serrate (scarcely subpinnatifid), serratures bristle-pointed, sori biseriate or scattered, involucre at length almost concealed by the capsule.—*Kze. Bot. Zeit.* vi. p. 509. *Metten. Aspid.* p. 51. *Hook. 2nd Cent. of Ferns*, t. 56.

Hab. Japan, *Goring, C. P. Hodgson, Esq.* Island of Tsus Sima, Gulf of Corea, *Wilford*.—This again is a most distinct and well-marked Fern, and one of great elegance, not likely to be confounded with any other. It is only the lowest pair of pinnæ that are much elongated and again pinnated; in that respect therefore it is more compound than several that follow in this "pinnated" section; but not enough so to be considered strictly bipinnate.

20. A. (*Polystichum*) *Tsus-Simensense*, Hook.; caudex short thick oblique crowned with large black lanceolato-subulate falcate black scales, stipites tufted slender a span long stramineous, at the base scaly with the same black scales as the caudex mixed with slenderer subulate ones and black hairs, fronds (the very young and undeveloped ones 2 and more inches high clothed with long circinate black subulate and long pointed scales) a span to a foot long finely acuminate chartaceous bipinnate pinnate above, pinnæ 1-1½ inch long shortly petiolate from a broad base gradually acuminate falcate superior base truncated and forming a large spinulose-pointed auricle, pinnules very compact ovate spinulose at the apex entire or with very minute mucronate serratures ultimate ones confluent, superior pinnæ simple lobato-pinnatifid, the lobes, spinulose ultimate ones confluent into a long-attenuated apex, lowest pair of pinnæ scarcely smaller than the rest deflexed, sori 2-4-6 on each side the costule, involucre thin-membranaceous orbicular and flat. (TAB. CCXX.)

Hab. Island of Tsus Sima, in the Straits of Corea, *C. Wilford*.—I find no described species to accord with this. The scales of the caudex are singular in shape and peculiarly black: the upper portion of the frond is pinnated, the rest regularly bipinnate, the lowest pair of pinnæ deflexed.

21. A. (*Polystichum*) *semicordatum*, Sw.; caudex thick horizontal creeping (?) very densely clothed with long ( $\frac{3}{4}$  of an inch) subulate scales, stipites solitary (not tufted) stout a span and more long shaggy with long slender paleaceous scales at length deciduous, fronds 2-3 feet long broad or ovato-lanceolate (8-10 inches wide) coriaceo-membranaceous blackish-

green (when dry) pinnated, pinnæ articulated upon the rachis numerous approximate horizontal, from a broad sessile shortly petiolated semicordate base oblong acuminate straight or falcate entire or obtusely crenate (never spinulose), sori mostly on the back of the veinlets in four series two on each side, the inner one close by the costa the other between it and the margin, veins fascicled, involucres orbicular slightly convex depressed in the middle suberose.—*a. Americanum*; lobe or auricle of the superior base of the pinnæ obsolete. *A. semicordatum*, *Sw. Syn. Fil. p. 45. Willd. Sp. Pl. v. p. 222. Metten. Aspid. p. 36.* Polystichum, *Moore. Cyclopeltis, J. Sm. Lastrea, Pr. Polypodium, Sw. Fl. Ind. Occ. iii. p. 651. Aspid. caducum, H. B. K. Nov. Gen. Am. i. p. 12. Kaulf. Enum. Fil. p. 233. Polypodium, Willd. Sp. Pl. v. p. 193. Hemicardium Nephrolepis, Fée, Gen. Fil. p. 262. H. macrosorum, Fée, Mém. Foug. viii. p. 101. Lingua cervina foliis ensiformibus serratis. Plum. Fil. p. 98. t. 113.—*β. Preslianum*; lobe or auricle of the superior base of the pinna rounded, but smaller than the inferior one which is falcate. *Aspidium Preslianum, Metten. Aspid. p. 36. Lastrea, J. Sm. in Hook. Journ. Bot. iii. p. 462. Polystichum, Moore. Nephrodium semicordatum, Pr. Reliq. Hænk. i. p. 32 (the Luzon plant). Hemidictyon Cumingianum, Fée, Gen. Fil. p. 283. t. 22. f. 2. Hemicardium subhastatum, Fée, Gen. Fil. p. 282, name only (superior lobe a little more divaricated).—*γ. crenatum*; superior base of the pinna obliquely truncated, lower lobe or auricle variable in size. *Hemicardium crenatum, Fée, Gen. Fil. p. 283. t. 22 A. I.—δ. truncatum*; pinnæ at the base on each side transversely truncated.**

*Hab. a. Americanum.* Tropical America: West Indian Islands, probably universal; throughout Venezuela, New Granada; Esmeraldas, Ecuador, *Seemann*; Central America, *Cuming, n. 1244*; Panama, *Sinclair, Hayes, n. 74*; Galapagos Islands, *Capt. Wood*. Valley of the Amazon, Rio Managuary, *Spruce, n. 1610*, and Tarapota, Eastern Peru.—*β. Preslianum.* Luzon, *Presl, Cuming, n. 68.* Solomon Islands, *Milne*, (superior basal lobe divaricated, as that from Amboyna, *Labillardière, Herb. Hook. ex Herb. Webb*).—*γ. crenatum.* Cochin China, *Gaudichaud*; Borneo, *Wallace, Thos. Lobb (Sarawak)*.—*δ. truncatum.* Twa Kabin, Moulmein, *Rev. C. S. P. Parish*.—This species has no near affinity with any of the *Polystichum*-group, but it is not therefore needful to constitute a genus: nor, whether a genus or not, is there any need for constituting five species of the original *semicordatum*. Presl was quite right in uniting the Luzon plant (since called *Preslianum*) with the American *semicordatum*. *Hemicardium crenatum* and *subhastatum* of Fée (both oriental Ferns) differ in nothing but the greater or less development of the lobes at the base of the pinnæ, quite obsolete in those of my var. *truncatum* (as indeed Plumier has represented them in his American plant).—*H. Cochinchinense*, Fée, is nowhere described or in any way characterized. My

authentic specimens of *H. macrosorum*, Fée (*Schlim*, New Granada, n. 658), do not exhibit the shadow of a difference from *semicordatum*. The fronds, although apparently articulated upon the rachis, and although the dilated base of the short petiole has a dark mark and a depression around it, as if the pinnæ would fall away there, yet in all my numerous specimens the latter are singularly persistent.

\*\*\* *Fronds bi-rarely tri-pinnate.*

22. A. (Polystichum) *aculeatum*, Sw.; caudex short suberect, stipites tufted and rachises more or less clothed with ferruginous scales of two forms, one slender and resembling hairs, on the stipes especially, mixed with large ovate or lanceolate ones sometimes two-coloured, fronds 1-2-3 feet long oblong-lanceolate acuminate sometimes proliferous bi-rarely tripinnate subcoriaceous, primary pinnæ approximate from a broadish subpetiolated base oblong- or linear-lanceolate subfalcate, pinnules close subrhombic-ovate or lanceolate free subpetiolulate or decurrent at the very base with the adjacent ones spinosely or setosely serrated or lobate, the superior base more or less auricled, sori generally in two rows on each pinnule and usually nearer the costa than the margin, costæ and costules more or less villosa-paleaceous beneath.—*Polypodium aculeatum*, Linn.

Hab.\* Almost every part of the known world:—

1. Throughout EUROPE. As Linnæus described his *Polypodium aculeatum*, Linn. *Sp. Pl.* p. 1552, from European specimens, "Hab. Europa," and as he had but one species of this group in view (since extended to three), it is but reasonable to consider that the type of the species. We may then add *Aspidium aculeatum*, Bent. *Hand. Brit. Flora*, p. 628, and *Hook. Brit. Ferns*, tt. 10, 11, 12. A. *lobatum*, Metten. *Aspid.* p. 48. The pinnules are variable, and hence chiefly three species have been formed by European Botanists, viz.: 1. *Aspidium aculeatum*, Sw. in *Schrad. Journ.* 1800, ii. p. 37, and *Syn. Fil.* v. p. 258 (the frond rigid, but submembranaceous; pinnules subsessile, more or less auricled; serratures spinulose). *Schkh. Fil.* t. 39: very good. *Willd. Sp. Pl.* v. p. 258. *Sm. F. Brit.* p. 1122. *Engl. Fl.* iv. p. 277. *Engl. Bot.* t. 1662.

\* With my perhaps peculiar views of the universal distribution of this species which has been described under so many different names in the Floras of different regions, I should despair of making myself intelligible unless I include the synonyms under the different countries they inhabit; and these localities I shall take almost exclusively from specimens preserved in my own herbarium. I shall offer a few remarks as I proceed, in order to explain my reasons for thus uniting so many species which have been preserved by many able botanists as distinct. It is certain that the very extensive suites of specimens in my possession give me an advantage in forming an opinion, such as perhaps none of my predecessors or cotemporaries have enjoyed; but I am compelled to omit a considerable number of synonyms of very trustworthy authors, because of the difficulty of ascertaining the exact forms they intend, or to admit them only with a doubt.



*Hook. and Arn. Brit. Fl. ed. 8. p. 582. Polypodium aculeatum, Huds. Angl. p. 459. Polystichum aculeatum, Roth, Fil. Germ. iii. p. 79. Moore, Br. Ferns, Nat. Print. t. 10. Aspid. aculeatum,  $\beta$  intermedium, Hook. Brit. Ferns, t. 11. Aspid. Braunii, in Spen. Fil. Frieb. (Braun in Herb. Nostr.). 2. Aspid. lobatum, Sw. in Schrad. Journ. 1800, ii. p. 37, and Syn. Fil. p. 53 (frond more rigid, subcoriaceous; pinnules sessile, decurrent, and more or less confluent at the base, superior basal pinnule the largest, and that pinnule chiefly auricled). Schk. Fil. t. 40. Sm. Fil. Brit. p. 1123. Willd. Sp. Pl. v. p. 260. Engl. Bot. t. 1563. Hook. and Arn. Brit. Fl. ed. 8. p. 582. Polystichum aculeatum, in part, Moore, Brit. Ferns. Nat. Print. t. 10. A. aculeatum, var. lobatum, Hook. Brit. Ferns, t. 10. 3. Aspid. angulare, Willd. Sp. Pl. v. p. 257. Sm. Engl. Fil. iv. p. 278. Engl. Bot. Suppl. t. 27, 6 (fronds more membranaceous, more chaffy; pinnules small orbicular-rhomboid, mostly auriculate: the deep serratures setiferous rather than spinulose). Hook. and Arn. Brit. Flora, ed. 8. p. 583. Aspid. aculeatum,  $\beta$ , Sm. Fil. Brit. p. 1122. Var. *b. angulare*, Braun in Mett. Fil. Hort. Lips. p. 88. Aspid. p. 48. Var. *angulare*, Hook. Brit. Ferns, t. 12. Polystichum angulare, Presl, Tent. Pterid. p. 83. Moore, Brit. Ferns, Nat. Print. t. 12, 13. Of these are so many intermediate passages from the one kind to the other, that no one, I think, can study them with an unprejudiced mind, without seeing the propriety of looking upon them as one species; and the three several forms are by no means confined to the countries now under consideration. Our typical form is common throughout Britain and the temperate and even the warmer parts of Europe, in Spain and Portugal, Greece, Heldreich, Morea (*Hypopeltis lobulata*, Bory), Calabria (*Asp. hastulatum*, Tenore, Pavillon in Herb. Nostr.).*

2. NORTH AMERICA. United States, apparently rare: (not in Chapm. Fil. of S. U. St.) Mountains of New Hampshire, Vermont, probably nowhere south of New York. Not found in Canada: but it appears in N. W. America, near the sources of the Columbia, Drummond. Sitka (*Aspid. vestitum*, Bongard, Veg. of Sitka, p. 57, and in Herb. Nostr.); Nutka, Haenke.

3. AFRICA and adjacent islands. North Africa: Madeira, abundant (mostly *angulare* form); Teneriffe, *Bourgeau* (*Aspid. angulare*, Webb); Azores, abundant, *Seubert* (*A. angulare*, *Seub.*); Mount Silke, Abyssinia, *Schimper*, It. Abyss. n. 680 (typical form); Fernando Po, on the Peak, elev. 9000 feet, *G. Mann*, the common European form. South Africa: Cape Colony, frequent, Cape to Natal (*Aspid. pungens*, \* *Kauff. Schlecht. Adumbr. p. 21. t. 10*); generally larger and broader than the European form, with a tendency to be tripinnate, and with more distant pinnae and pinnules; the latter more elongated and more falcate. *Aspid. luctuosum*, Kze., and *Pappe and Rawson*, is quite our European and typical form. *Pappe and Rawson* (*Syn. Fil. Afr. Austr.*) bring into the Cape Flora "*Aspid. angulare*, Kit.;" and my specimen of *A. luctuosum*, from Sir George Grey, would, I think, be referred to that by some botanists: and Mr. Moore remarks, in Herb. Nostr., my Natal specimen of *angulare* is quite a normal English form. From the Cape, Milne, and from Natal (*Captain Garden*), I possess specimens quite according with the *Aspid. stramineum*, *Kauff.*, of Mauritius. Bourbon, *Carmichael*, and

\* Possibly I may be wrong in referring the *Aspid. pungens*, *Kauff.*, to the present species, especially if, as *Schlechtendal* says, the caudex is really "horizontalis proprensus," which I have no means of confirming. One of my specimens, indeed, from Ecklon (under n. 4610) is so extremely unlike the figure of *Schlechtendal* (Tab. X.), that I had long considered it totally distinct from *pungens* or *aculeatum*, in its great size (between 4-5 feet long, including the densely paleaceous stipes), its very compound, though narrow-lanceolate and acuminate pinnules, deeply pinnatifid and even again pinnatifid, quite tripinnate; but I find intermediate forms which it must be confessed too much resemble *aculeatum* to induce me, in the present state of my knowledge, to keep them separate.

Mauritius, *Sieber, Syn. Fil. n. 34, Bojer and others*; fronds broad, pinnae large rhombic-ovate: this is *Aspid. stramineum, Klf. in Spreng. Syst. Veg. iv. p. 105, Metten. Aspid. p. 50. An Polystich. Sieberianum, Pr.?* which I hardly venture to consider distinct from *aculeatum*. In general the chaffy scales are all pale brown as in the European *aculeatum*, but, what is very remarkable, some of my specimens (with no other difference) have an admixture of the large black rigid curved scales, with pale margins, on the stipes, characteristic of some of the Antarctic states of the so-called *Aspidium vestitum* (Polyp., *Forst.*) of the more extreme southern portion of the southern hemisphere. Some of our fronds, on the other hand, from Mauritius exactly correspond with the typical *Aspid. aculeatum*.

4. INDIA proper: the Indian continent, excluding the Malay Peninsula and Islands. In this vast territory this species, in my extended views of it, abounds, and, as may be expected, it assumes various forms, according to the amount of heat and moisture and elevation upon the mountains, so that many *supposed* species have been formed of it. I find some of the chief differences depend on the paleaceous clothing; this however is deceptive, for it is more or less deciduous, sometimes entirely so. Among the most remarkable is the *Aspidium rufobarbatum, Wall. Cat. pp. 369 and 370. Polystichum, Pr. Aspid. squarrosum, Don, Prodr. Nep. p. 1. Metten. Aspid. p. 46. Also Aspid. setosum, Wall. Cat. n. 371. Polyst. Wallichianum, Pr. Aspid. lentum?* and *discretum, Don.* The large and the copious fine villiform paleae are often of a rich ferruginous colour; and the young undeveloped fronds, when about a foot high, are most densely clothed with long silky hairs of a truly golden hue, but which disappear in age. In India *Aspid. aculeatum* has a very extended range in mountain regions of the north, from Nepal (*Aspid. discretum, Don*), Kumaon, and Sylhet, all along the Himalayan range, from the extreme west to Bhotan in the east, varying extremely in size; some merging into the large forms of the Cape of Good Hope and Mauritius, others quite according with true *aculeatum*, or the *angulare* form, while some of our specimens tally with the strongest marked *lobatum, Wallich, Griffith, Hooker fil. and Thomson* (Sikkim, etc.), *Edgeworth, Strachey and Winterbottom* (elev. 8-10,000 feet), *Jacquemont, Colonel Bates. Nilghiri hills, Dr. Wight, Cat. n. 110, Schmid, (Aspid. brachypterum, Kze. in Linnaea, xxiv. p. 288, and in Hohenacker, Pl. Ind. Or. n. 906, and Aspid. subinerme, Kze. in Linnaea, xxiv. p. 200), G. Thomson, M'vor. Khasya and Assam, Mrs. Mack (angulare), Simons, Hooker fil. and Thomson* (some specimens with very large black scales edged with rufous).

5. CEYLON. Specimens generally large, paleaceous tawny scales often mixed with black ones; others quite the European *aculeatum, Mrs. General Walker, Gardner, Thwaites, C. P. n. 1376, 3503.* Some specimens cannot be distinguished from the Javanese *Aspid. acutifolium* and *Aspid. Moluccense, Blume.*

6. MALAY PENINSULA AND ISLANDS. In this region *Aspid. aculeatum* appears under two or three forms. 1. Size and general character of typical *aculeatum*; Java, *Blume, A. sublobatum, Bl. En. Fil. Jan. p. 166, a. Aspid. Moluccense, Bl. En. Fil. Java, p. 168. Moluccas, Bl. in Herb. Nostr. Java, De Vriese and Teijsmann, n. 586, 598, 597, 294. Lobb, 262* (some specimens, var. *angulare*). Ceram, *De Vriese and Teijsmann, n. 586*—Larger and with submarginal sori. Java, *Blume, Aspid. vestitum, Bl. En. Fil. Jav. p. 165, and in Herb. Nostr. Var. biaristatum?*; coriaceous acuminate, the long suddenly acuminate apex pinnate, habit of var. *lobatum*, with the apex of the pinnule and auricle chiefly aristate, sori marginal. *Aspid. biaristatum, Bl. En. Fil. Jav. p. 164, perhaps distinct. Java, Blume, in Herb. Nostr.; Singapore, Sir Wm. Norris; Moulmein, Thos. Lobb, Parish, n. 72. Tripinnate. Aspid. mucronifolium, Bl. En. Fil. Jav. p. 164. Java, Blume, in Herb. Nostr. Polystichum discretum, J. Sm. (not Don).* Polystichum acutifolium, *Pr. Epimel. Bot. S. Comarines, Cuming, n. 181 and 182.*

7. CHINA AND JAPAN, Bonin Islands (*from Imp. Acad. Petersburg*). Common Indian form. Island of Tsus-Sima, off the coast of Korea, *Wilford*; typical *acu-*

*leatum*. Simoda, Japan (true *aculeatum*), *C. Wright, U. S. N. Pacif. Expl. Exped.* Polystichum polyblepharum, *Kze. in Bot. Zeit.* vi. p. 572; Mr. Wright justly observes, "probably not distinct from *angulare*." An Polypod. lacerum, *Th. Fl. Jap.* p. 337? *Aspid. Sw. Willd.*?

8. TROPICAL AMERICA. Much of the *Aspid. aculeatum* of tropical America is the *Aspid. Moritzianum*, *Kl. in Linnæa*, xx. p. 367, and *Aspid. ordinatum*, *Kze. in Linnæa*, xviii. p. 347, between which I can perceive no difference; and they quite tally, some with the typical forms of *aculeatum* and var. *angulare*, others, from the larger size, correspond with the usual tropical condition of the species. Abundant in Columbia and Venezuela, *Moritz*, n. 580. *Linden*, n. 157 and 154, 539, 1025. *Schlim*, n. 481 (large and numerous scales on the rachis). *Fendler*, n. 172, 173 (some with large brown scales on the rachis, an inch long), and 174 (with very large black glossy scales, and fulvous margins at the base of the stipes); Boqueta, Veraguas, *Seemann*, n. 1118. Antioquia, *Jervise*.—Brazil, *Sellow (angulare)*, *Gardner*, n. 133, and Organ Mountains (quite *Aspid. Moritzianum*).—Peru, Tarapota, *Spruce*, n. 4743. Chacapoyas, *Mathews*, n. 3285 (var. *angulare*). Tabina, *Lechler*, n. 2087, with glossy membranaceous scales on the stipes, an inch long and more than half an inch wide. Ecuador: Quito, *Jameson (angulare)*; Tunguragua, *Spruce*, n. 5305. Mexico, *Jurgensen*, n. 901. *Galeotti*, n. 64, 74. *Liebold* (*Aspid. ordinatum*, *Kze.*, *Liebm.*). *Linden*, n. 1536.—Guatemala, *Hartweg*, n. 631 (*Aspid. Hartwegianum*, *Kl. in Linnæa*, xx. p. 366, *Skinner* (copious specimens, varying from *angulare* to *Moritzianum* or *ordinatum*); Volcano de Fuego, 7000 feet elev. *Osb. Salwyn (Aspid. Moritzian.)*.—Andes of Mendoza, Sierra del Portezuela, *Gillies (angulare)*. An Polyst. *Sellowianum*, *Pr. Tent. Pterid.* p. 83. n. 787?

9. CHILI: Valdivia, *Lechler*, n. 211, 515. *Aspid. vestitum*, *Lechler* (typical *aculeatum*), *W. Lobb, Bridges*, n. 805; and *Lechler*, n. 515 b (*Aspidium Lechleri*, *Metten.* n. sp., same as *Moritzianum*). Concepcion, *Cuming*, n. 167. Polystich. *Cumingianum*, *Presl, Epimel. Bot.* p. 54. Cordillera de Remio, *Lechler*, n. 787 (*Aspid. vestitum*, *Lechl.*). S. Chili, *Philippi* (Polystichum *aculeatum*?, *Phil.*), probably *Aspid. Brongniartianum*, *Gay*, and *Aspid. Bridgesii*, *Schott and Sturm*, are to be referred hither. Concepcion, *Lay and Collie* (*Aspid. subintegerrimum*, *Hook. and Arn. Bot. of Beech. Voy.* p. 52. Chili, *Preppig* (*Aspid. vestitum*, *Kze.*). Chiloe, *Capt. Ph. King*. Juan Fernandez, *Scouler, Douglas, Bertero*, n. 1530. Polyst. tetragonum, *Fée*. Polystich. orbiculatum, *Desv. and Gay*, and *Aspid. pauciuspis*, *Sturm*, may, I believe, be safely referred here.

10. WEST INDIAN ISLANDS. It is remarkable that I have seen no well-pronounced form of our present species from these islands; unless a plant I have received from *Dr. Cruger* of Trinidad, "Serro de Arila," be from that island, as it probably is, though the same package contained plants avowedly from the opposite mainland of Venezuela. The specimens quite resemble a rather small form of the South American *aculeatum*, with pinnules a little more entire than usual. This I possess also from *C. Wright, Plantæ Cubenses*, n. 1056 (omitted in *Eaton, Fil. Wright et Fendl.*); it is proliferous at the apex, and the Polystichum heterolepis, *Fée, Gen. Fil.* p. 279, allied to *Polystichum viviparum*, *Fée*, n. 17 of this work, also from Cuba; but it is throughout (except at the apex) bipinnate, and in all other respects quite accords with *aculeatum*. This seems to confirm an opinion we have expressed under *Aspid. viviparum*, that this latter may be an imperfectly developed state of *Aspid. aculeatum*.

11. SANDWICH ISLANDS. I possess no plant of the *aculeatum*-group from these islands; but Brackenridge's Polystichum Haleakalense, *Fil. U. S. Expl. Exped.* p. 204. t. 28, is from Hawaii. This I have little hesitation in referring to *aculeatum*, and no peculiar form of it. Indeed, the author says, "Allied to *Aspid. vestitum* of Sw. (our *aculeatum*), from which, however, it is sufficiently distinct, in the much smaller size of the whole plant, the shorter pinnæ, and the deeper incised pinnules."



12. NEW HOLLAND, NEW ZEALAND, AND SOUTHERN ANTARCTIC REGIONS. These countries are rich in plants of the *aculeatum*-group; and the first perhaps published was under the name of *Polypodium vestitum*, *Forst. Prodr. n. 445*. *Aspidium*, *Sw. Syn. Fil. pp. 53 and 254*. *Schk. Fil. t. 43*. *Willd. Sp. Pl. v. p. 261*. Forster unfortunately gives no locality for his plant. Schkuhr, who is generally considered to have derived his specimens of Forster's Ferns from Forster himself, is equally silent: his figure faithfully represents *Aspid. aculeatum*. Swartz says, "Insulæ Maris Pacifici," but he offers no authority; Willdenow, "New Zealand and New Holland." It would indeed appear that nearly all the *aculeatum* growing in countries whose shores are washed by the Pacific, have borne the name of *vestitum*. Their fronds are not unfrequently proliferous, and then they become the *Aspid. proliferum*, *Br. Prodr. p. 147*. In New Zealand (Northern Island, *Colenso*; Middle Island, *Joliffe, Dr. Munro*). In Banks's Island is a variety well worthy of notice, from its rigid habit, extreme regularity and uniformity of the pinnae and pinnules, the very straight rachis, and this covered on the under side with lanceolate, rigid, incurved, somewhat distichous, rather large, glossy black scales, edged with brown, giving great richness of colouring and beauty to the plant; to this *Colenso* has in his MSS. given the name *Aspid. pulcherrimum*. These scales are more or less abundant on other forms. I fear Dr. Hooker's *Polystichum aristatum*, *Fl. N. Zeal. ii. p. 37. t. 78* (not *Aspid. aristatum*, Sw.), can only be considered as the *lobatum* form of *aculeatum*. *Aspid. aculeatum*, then, as we venture to call the species, is common in mountain districts throughout the Northern and Southern Islands of New Zealand, *Banks and Solander, Colenso, J. D. Hooker, Lyall, Joliffe, Munro, Sinclair, Travers*, etc. It is variable in the margins of the pinnules, sometimes almost entire, sometimes spinuloso-serrate, sometimes again pinnate, so that the fronds are then tripinnate.—In *Australia* it is known only, I believe, on the south-eastern portion, from Sydney to Hunter's River; this is the *Aspid. proliferum*, *Br.*, as we have before observed (not of *Hook. and Grev.*) and *Meltem. Aspid. p. 49*, and *Aspid. radicans*, *Sieb. Syn. Fil. p. 104*.—In *Tasmania* it is more common in subalpine situations, as on *Mount Wellington*, from 3000 feet elev. to the summit.—In the subpolar regions *Aspid. aculeatum* is more uniform as far as we yet know, always stout, firm and coriaceous, very paleaceous, and the large scales varying much in colour from rich tawny to entire black, or with a paler and sometimes well-defined edge; pinnules often very convex on the upper side. It is the *Polystichum venustum*, *Hombr. and Jacquemant. Voy. au Pôle Sud, t. 5. N.* (without description); Lord Auckland's and Campbell's Islands, from the level of the sea to 1200–1400 feet, caudex 2–4 feet high; and Falkland Islands, *J. D. Hooker*; Macquarrie Island, *Fraser*; *Tierra del Fuego, Darwin*.

23. A. (*Polystichum*) *Prescottianum*; caudex short thick erect or declined paleaceous with very large brown scales, stipites densely tufted stout 1–4 inches long and as well as the stramineous glossy rachis and costæ and veins especially beneath villous with soft lax hair-like pale-coloured scales, on the stipes mixed with large ovate membranaceous ones, fronds 1–2 feet long rarely in the broadest part 2 inches wide elongato-lanceolate acuminate soft and membranaceous gradually narrowing at the base pinnate or subbipinnate, pinnæ ovato-oblong sessile tapering to an obtuse apex deeply pinnatifid (except at the very apex) almost to the costa (some of the inferior ones pinnate), lobes or pinnules ovate or oblong without auricle strongly and uniformly serrated the

serratures with long soft hair-like points, sori chiefly on the superior half of the frond in two rows near the costule, involucre peltate entire membranaceous. (TAB. CCXXIII.)—*Aspid. Prescottianum*, Wall. Cat. n. 363. Metten. *Aspid.* p. 48. *Polypodium Pseudo-Lonchitis*, Jacquemont, MSS. in *Herb. Hook.*— $\beta$ ; frond bipinnate.

Hab. Kumaon, Wallich. Inhabiting the whole range of Himalaya from the extreme west, to Bhotan in the east; elev. 10–12,000 feet, Jacquemont, n. 72, 73, 76, 77, Edgeworth, Strachey and Winterbottom, Hooker fl. and Thomson, Griffith.—A well marked species in the soft paleo-setaceous clothing, in the very narrow and elongato-lanceolate flaccid fronds, and above all in the very long hair-like points to the sharp serratures. It seems peculiar to northern India, but there, apparently at great elevations, has been detected throughout the whole range of the Himalayas.

24. A. (*Polystichum*) *Richardi*; caudex short thick scaly, stipites tufted  $\frac{1}{2}$ –1 foot long hirsuto-paleaceous, scales mixed with larger and almost black deciduous ones, fronds of the same length as the stipes, very rigid and coriaceous (brown when dry) oblong-ovate suddenly and finely acuminate sub-furfuraceous beneath with minute subulate scales ciliated at their broad base, pinnate (rarely subbipinnate), pinnæ 2–3 inches long petiolate close and compact lowest 2–3 pair only rather distant lanceolate finely acuminate deeply pinnatifid nearly to the costa (inferior ones sometimes free but decurrent at the base), segments lanceolate numerous close-placed mucronato-acuminate the margin entire or obsoletely crenate rather than serrated, acuminate apices of the fronds and pinnæ pungently and sharply serrated, sori in two rows on each segment, involucre orbicular, main rachis subulate-paleaceous beneath with blackish scales. (TAB. CCXXII.)—*Aspid. aristatum*, var., Hook. Fl. N. Zeal. p. 37 (in part); and f. 5. of t. 78, corresponds with a segment of our plant; and Dr. Hooker on our specimens here figured, has written “*Aspid. coriaceum*, var. *acutidentatum*, Ach. Rich. N. Zeal. p. 10.”

Hab. New Zealand; Northern Island, D’Urville; Sides of cliffs, Tangururu Bay, Colenso; rocky shores of an island in the Wyran River, Hook. fl.—I have in my remarks under *Aspid. aculeatum*, observed that Dr. Hooker’s principal figure of his *aristatum* of New Zealand, is not that of Swartz and Schkuhr, but what we consider a form of *A. aculeatum*. With that he includes the plant I here describe and figure, whose whole aspect and character are so unlike both *aristatum* and *aculeatum*, that Richard considered it a very sharply toothed var. of *Aspid. coriaceum*, but from that also it is widely distinct. If not a peculiar species, it must be united, as Dr. Hooker has done, with one of the forms of *A. aculeatum*; and there are specimens in our herbarium which almost connect it with a broad-lobed form of that species; thus adding one more to the aberrant forms of *A. aculeatum*.

25. *A. (Polystichum) microphyllum*, Bl.; "frond bipinnate coriaceous slightly hairy beneath, pinnules trapezoid mucronate mucronately serrulate, lowest ones auricled at the base above (auricles rotundato-mucronate), sori scattered, rachis and stipes paleaceous." *Bl. En. Fil. Jav. p. 163.*—*Kze. Bot. Zeit. vi. p. 282.* *Metten. Aspid. p. 49.* *Asp. amblyotus*, *Kze. Bot. Zeit. vi. p. 283?* *A. tacticopterum*, *Kze. in Linnæa, xxiv. p. 290.* *Metten. Aspid. p. 49?*

Hab. Java, *Blume, Zollinger, n. 408 z.*—Blume's character is much too brief for any practical use. Kunze says, "e grege *A. vestiti*," a plant which we refer to *A. (Polyst.) aculeatum*.—May not the East Indian *A. tacticopterum*, *Kze. l. c.*, be the same? or some form of *aculeatum*? Again, of his *A. amblyotus*, from Java, Kunze says, "præcedenti (*A. microphylo*) affine; sed pinnulis basi lobatis, medio et apice acute serratis diversum et multo majus." It is a hopeless task to determine them without access to authentic specimens or faithful figures.

26. *A. (Polystichum) obtusum*, Mett.; caudex a short thick scaly rhizome, stipites 4-5 inches long squarrose with copious ferruginous ovate very long pointed soft scales mixed with narrow subulate ones which continue up the rachis, fronds a span to nearly a foot long coriaceo-membranaceous slightly villous above ferrugineo-hirsute beneath oblong bipinnate, the apex long gradually acuminate, inferior pinnæ 2-3 inches long linear obtuse, their pinnules  $\frac{1}{2}$  of an inch long obovato-rhomboid very obliquely cuneate at the base, superior margin and apex chiefly spinuloso-serrulate, superior pinnæ oblong-rhomboid obliquely cuneate at the base, auricled above, veins forked close indistinct, involucres fringed at the margin. (TAB. CCXXI.)—*Metten. Aspid. p. 52.* *Polystichum*, *Presl, Epimel. Bot. p. 53.* *J. Sm. in Hook. Journ. of Bot. iii. p. 412 (name only).* *Mettenius refers hither Polyst. discretum, J. Sm., and P. horizontale and P. acutifolium, Pr. Epimel.*

Hab. Luzon, *Cuming, n. 234, Thos. Lobb.*—Mr. J. Smith speaks of this as a doubtful species. My specimens are very uniform. Thomas Lobb has found the same plant in the same island. It is remarkable in the lower half or rather more being bipinnate, the rest pinnate. Mr. J. Smith does not say to which species of the genus the present is most allied; I should say it cannot be far removed from some of the protean forms of *Aspid. aculeatum*.

27. *A. (Polystichum) oculatum*, Hook. (not Wall.); caudex? stipites a span long rather stout stramineous flexuose paleaceous with rather large rigid subulato-lanceolate black pale-margined scales, these scales are continued on the rachises but are smaller less deeply coloured and are mixed with

soft woolly hairs, fronds a foot long firm-coriaceous oblong-ovate moderately acuminate pale beneath, partially clothed above with woolly hairs entirely so beneath tripinnate, primary pinnæ ovato-lanceolate acuminate 2-3½ inches long, secondary ones 1 inch long of the same form bearing 9-11 pinnules ¼ of an inch long confluent at their base towards the apex, they and the segments ovate obtuse entire or more or less obtusely toothed mucronate at the apex, sori universal even to the narrow acuminate apex of the pinnæ 2-4 on each side the costa, involucre rather small orbicular and peltate quite black with a red-brown margin. (TAB. CCXXVIII.)

Hab. New Zealand (Wairarapa), Northern Island, *Rev. W. Colenso*; Middle Island, *Raoul*.—This is assuredly a very distinct species from any with which I am acquainted. It has something of the habit of small specimens of *Aspid. coriaceum*, with very small segments to the fronds, but the clothing, the ramification and the involucre are quite different. The segments are entire or very sparsely and obtusely toothed, the apex only mucronate. Although we have received this species from M. Raoul's collection (*Herb. Mus. Paris*), it does not appear in his 'Choix des Plantes,' unless he has combined it with *Aspid. coriaceum*.

28. A. (*Polystichum*) *amabile*, Bl.; caudex decidedly creeping thick as a swan's quill paleaceous with ferruginous scales, stipites solitary a span to a foot long slender subflexuose paleaceous below, fronds 6-12 inches long subdeltoideo-ovate acuminate bipinnate submembranaceous, primary pinnæ 5-11-12 rather distant terminal one as large as or larger than the rest all long petiolate, lowest pair often bipartite so as to form a pedate frond, pinnules petiolulate ½-¾ of an inch long obliquely rhomboid-ovate subfalcate acute subauriculate at the superior truncated base and coarsely spinuloso-serrated except at the inferior base, sori a single series at the sinuses of the serratures close to the superior margin and apex of the pinnules, involucre orbicular. (TAB. CCXXV.)—*Bl. En. Fl. Jav. p. 165 (in Herb. Nostr.)*. *Aspid. rhomboideum, Wall. Cat. n. 364. Metten. Aspid. p. 66. Polystichum, Schott (name only), and Presl, Tent. Pterid. p. 84. Epimel. Bot. p. 54. Lastrea, Moore.*

Hab. Nepal, *Wallich, n. 364. Java, Blume, Thos. Lobb. Luzon, Cuming, n. 131. N.E. coast of Formosa, C. Wilford*.—A very distinct and well-marked species, perhaps first detected in Nepal, and named by Wallich, but since found more abundantly in the Islands of the Indian Ocean. The primary pinnæ are all petioled, and these do not gradually contract into an acuminate point, but there is a terminal petiolated pinna resembling, but larger than, the lateral ones. Mettenius and Moore assign to this species a rotundato-reniform involucre: such may be occasionally produced; but our perfect ones are clearly orbiculari-peltate.

29. A. (Polystichum) *mohrioides*, Bory; caudex short thick erect or oblique densely clothed with black-brown glossy scales, stipites densely tufted stout subcarnose 3-6 inches or more long red-brown darker at the base with largish patent brown scales, fronds oblong-lanceolate coriaceous subacute obtuse 6-12 and more inches long pinnate, the pinnæ short and ovate lobato-pinnatifid and crenated or elongate and deeply pinnatifid with ovate segments or again pinnate especially below, or bipinnate with the pinnules ovate incised or serrated and even petiolate, serratures muticous, sori close compact in two rows upon the pinnule or segments at length confluent, involucre close almost imbricated orbicular dark brown slightly depressed in the centre, rachis partially paleaceous.—*Bory, Voy. Duper. Crypt. p. 267. t. 35. 1. Hook. fil. Fl. Antarct. ii. p. 392. t. 149. Brack. Fil. U. S. Expl. Exped. p. 44. Metten. Aspid. p. 44 (excl. Nephrodium trapezioides, Pr. and Hook., which belongs to Polypodium rigidum, Hook. and Grev.). Polystichum, Pr. Nephrodium, Desv. N. polyphyllum, Pr. Reliq. Hænk. p. 37. Metten. Fil. Lechl. p. 20. Phegopteris rigida, Metten. Aspid. p. 10. Aspid. plicatum, Pæpp. in Kze. Linnæa, ix. p. 94. Polystichum Hænkeanum, Pr. Tent. Pterid. p. 83. P. elegans, Claude Gay, Fl. Chilena, vi. p. 514. Fée.*

Hab. South Chili, *Pæppig*. Antuco, summit of the Pico de Pilque, Cordillera de Chillan, *Ph. Germain*, of Zalcareque, Province of Colchagua, *Claude Gay*, and of Aculeo, *Dr. Philippi*. Falkland Islands, *D'Urville*, *Darwin*, *Hook. fil.*, *Capt. Abbot*, *R. N.* Patagonia and Straits of Magellan, *Capt. Ph. King*, *R. N.*, *Lechler*. Orange Harbour, Tierra del Fuego, *Brackenridge*.—A very distinct species, but very variable, and the texture sometimes thick and coriaceous, sometimes simply pinnate, or partially bipinnate or wholly bipinnate. It is quite peculiar to the southern hemisphere, and chiefly confined to high southern latitudes, what may be called South Patagonia embracing the Falkland Islands. *Pæppig* and *M. Germain* indeed met with it in Chili proper; but the one on the summit of a very lofty mountain, Antuco, the other on the Andes of Chillan: and their specimens are of a green colour and with much less of a coriaceous texture. *Mettenius* offers the remark, "fortasse speciei sequentis var." (*Aspid. vestitum*, aculeatum, nobis), from which I think the muticous serratures will always keep it distinct. Mr. *Brackenridge's* specimens from Orange Harbour, its most southern locality, were only 3-4 inches high, growing very dense and compact.

30. A. (Polystichum) *Cystostegia*, *Hook.*; stipites apparently tufted 1-3 inches high tawny-brown and as well as the broad rachis and undeveloped portions of the frond paleaceous with copious long lanceolato-subulate pale ferruginous scales quite slender upwards, fronds 4-6 or 8 inches long oblong-lanceolate firm-membranaceous bipinnate, pinnæ

patent moderately distant (more crowded upwards) rarely exceeding an inch long, their rachises compressed subulate, pinnules scarcely  $\frac{1}{4}$  of an inch long ovate-lanceolate pinnatifid with few erecto-patent obtuse or acute muticous entire or subdentate segments, sori copious large for the size of the plant 2-3 on each pinnule, involucre thin-membranaceous hemispherical vesiculose peltate ferruginous. (TAB. CCXXVII.)

Hab. New Zealand, on elevated mountains: Northern Island, *Dieffenbach*: Middle Island, Discovery Peaks, 5800 feet, *Travers*; Rocks in Waira gorge, alt. 4400 feet, in extremely exposed cold situations, *Sinclair*. Between Lake Tennyson and the west coast, *C. Mailing*.—A new and very peculiar small species, with soft but stout stipites and rachises, which are very paleaceous; the ramification approaches that of *A. mohrioides* and *A. Prescottianum*; but the involucre are unlike those of any other species, being singularly thin and membranaceous, covering the sori with a large (in proportion to the size of the plant) hemispherical peltate bladder lid.

31. *A. (Polystichum) anomalum*, Hook. and Arn.; caudex erect?, stipites tufted 1-2 feet long stout at the base densely paleaceous with very narrow long flexuose ciliated scales (the lowest ones) and very large ciliated lanceolate thin broad-lanceolate ones almost an inch long, the latter kind (but smaller) continue upwards upon the stipes and main rachis and are deciduous, fronds ample  $1\frac{1}{2}$  foot and more long subcoriaceous ovato-lanceolate bi- rarely below tripinnate, primary pinnæ 6-8 inches long lanceolato-acuminate, pinnules shortly petiolate subfalcate obliquely ovate or ovato-lanceolate acute lobato-pinnatifid coarsely serrated towards the apex rarely obtuse or mucronate, superior truncated base auriculate, sori biseriate terminal on the veinlets *usually on the superior face*!, involucre when present orbicular peltate very frequently wanting.—*Polypodium anomalum*, Hook. and Arn. MSS. *Hook. in Kew Gard. Misc. viii. p. 360. t. 11. Metten. Aspid. p. 12. Polystichum anomalum, Thwaites.*

Hab. Ceylon, *Mrs. General Walker, Thwaites*; Horton Plains and Hapootelle, alt. 5-6000 feet, n. 3504. A state of this, as it appears to me, with the sori all dorsal, is found by *Mr. Thwaites*, n. 3286: this is quite destitute of scales and has some of the pinnules  $1\frac{1}{4}$  inch long. The species is in cultivation in Kew, and retains its usual peculiarity of bearing the sori on the upper or anterior side of the frond. *Mr. Thwaites* has sent specimens with involucre, and the habit is very much that of *Aspid. aculeatum*.

\*\*\* *Tri-quadrupinnate or decomposed.*

32. *A. (Polystichum) aristatum*, Sw.; caudex long stout creeping densely crinite with long subulate ferruginous scales,



stipites distant a span to a foot and 2 feet long the base copiously crinite (as in the caudex below) the rest and the rachises partially and sparsely setoso-paleaceous, fronds a span to 1 and 2 feet long deltoideo-ovate suddenly acuminate 3-4-pinnate more or less coriaceo-membranaceous glossy, primary pinnæ all petiolate lanceolate finely acuminate, lowest primary ones with the basal secondary pinnæ very much elongated (hence the frond is pedate) and again once or twice pinnated, pinnules obliquely ovato- or rhomboideo-lanceolate petiolulate subfalcate subauriculate mostly mucronato-serrate, sori generally in two rows on each pinnule, involucre rather small usually plane orbicular and peltate rarely subreniform. —*a. aristatum, verum*; a span to a foot long tripinnate below, pinnules approximate. *Aspidium aristatum, Sw. Syn. Fil. pp. 53, 253, and 421 (excluding the locality of New Zealand). Schk. Fil. p. 44. t. 42 (a lower primary pinna, excellent). Willd. Sp. Pl. v. p. 264. Bl. En. Fil. Jav. p. 166. Metten. Aspid. p. 47. Endl. Prodr. Fl. Norf. p. 8. Polystichum, Pr. Tent. Pterid. p. 83 (not Hook. Fl. Nov. Zel. ii. p. 37. t. 78, which is probably one of the lobatum-varieties of A. aculeatum). Lastrea, Moore. Polypodium aristatum, Forst. Prodr. p. 82. Polystichum biauirtum, Eat. in Herb. Nostr.—β. coniifolium*; fronds larger, often 2 feet long, below 4-pinnate, pinnules generally larger and more lax. *Aspidium coniifolium, Wall. Cat. n. 341. Metten. Aspid. p. 67. Lastrea aristata, α and β, Moore, Ind. Fil. p. 88. (Mettenius refers here Aspid. sporadosorum, Kze. Bot. Zeit. vi. p. 536). A. palmipes, Kze. in Linnæa, xxiv. p. 287. Aspid. caruifolium, Kze. in Linnæa, xxiv. p. 292, and A. curvifolium (ex errore typog.), Kze. in Bot. Zeit. vi. p. 283.—γ. Hamiltonii*?; pinnules larger, more lanceolate, more opaque, generally more coriaceous, involucre very convex, peltate, but subreniform (some specimens approaching *A. coriaceum*). *Aspid. Hamiltonii, Spreng. Syst. Veget. iv. p. 108?* (an *A. Hamiltonianum*?, *Wall. Cat. n. 2232, "not in Herb. Wall. Moore, nor in Hook. Herb."*). *Polystichum Hamiltonii, Moore, Ind. Fil. p. 92 (a deformed state of this is the Aspid. Cornu-Cervi, Don).*

Hab. α. Pacific Islands, *Forster, Nightingale, in Herb. Nostr.*; Ngau, Raoul Island, Aneiteum, Sunday Islands, Feejee Islands, *Milne and Macgillivray, Seemann, n. 742. Elizabeth Island, Cuming, n. 1425. Norfolk Island, abundant, All. Cunningham, Simmons, Dr. Falconer. China: Foochowfoo and Koolung, Alexander*; Hongkong, *Wilford, Urguhart, Champion. Tsus-Sima, Gulf of Corea, Wilford. Japan, Nangasaki, Babington, Miss Nelson*; Tukunc-Sima, *C. Wright, in U. S. N. Pacif.*

*Expl. Exp.* 1853-56. India (generally larger than from the preceding countries, and approaching var.  $\beta$ ). Java, *Blume, Lobb*. Borneo, *Wallace*. Luzon, *Cuming*, n. 262. Nilghiri, *Wight*, n. 109, *M'Ivor, Beddome*, n. 131. Nepal, *Wallich*. Khasia, Sikkim, etc., *Hook. fil. and Thompson*, n. 273. Ceylon, *General Walker, Gardner*, n. 1373, *Thwaites*, n. 3384.— $\beta$ . Nepal, Nilghiri, Kumaon, *Wallich*. Mountains, N. Bengal, frequent, *Hook. fil. and Thomson*, n. 273 b. Bhotan, *Griffith*. Ceylon, *General Walker*. Moulmein, *Parish* (ultimate pinnules very narrow). Raoul Island, S. Pacific, *Macgillivray* (approaching var.  $\gamma$ ).— $\gamma$ . Nepal, *Wallich*; Khasia, elev. 4500 feet, *Hooker fil. and Thomson*, n. 275. Ceylon, *Mrs. General Walker*, n. 212 (in aspect approaching *Aspid. stramineum*, Kaulfs. pinnules broad, sori depressed and forming corresponding elevations on the superior surface; some of the pinnules slightly distorted); Nepal, 1820, *Wallich* (many pinnules abnormal); Pupulath and Nepal, 1821, *Wallich* (pinnæ coriaceous very abnormal, all cuneate eroso-laciniate. *Aspid. Cornu-Cervi, Don*).

A widely dispersed species in India and the Indian Pacific Ocean, and I fear very variable; but much misunderstood, and mainly so perhaps in consequence of the imperfect character given by its discoverer (*Forster*), and from Swartz having given New Zealand as its native country. There is reason to believe that Schkuhr's plant is a true and authentic one, most probably derived from Forster himself, and the locality there given (for it is omitted in Forster's Prodrum) is not New Zealand, but the Pacific Islands; nor, familiar as I am with the Ferns of New Zealand, have I ever seen a specimen from that country. With regard to the synonyms, Mr. Moore is the first to unite the *A. conifolium*, Wall., with *A. aristatum*, correctly so, I believe. Some of the forms of this gradually pass into what I take to be *Aspid. Hamiltonii*, and some forms of this approach the less robust states of *Aspid. coriaceum*.

33. A. (*Polystichum*) *biaristatum*, Bl.; caudex erect?, stipites tufted a span to a foot long stout very paleaceous below with long subulate castaneous scales (sometimes having a black central line) mixed higher up with large broad-lanceolate intensely black glossy ones, the rest of the stipes with more or less deciduous and copious crinite scales at length glabrous, fronds 1-2 feet high very firm-coriaceous glossy from a broad base ovate-oblong suddenly acuminate at the apex (hence subcaudate) bipinnate, pinnæ sessile or nearly so oblong acuminate (acumen serrated) lowest ones often 6 inches long, pinnules oblique semiovate or rhomboid rarely sublanceolate subfalcate acute serrate sublobate at the superior truncated base  $\frac{1}{2}$  an inch to an inch long, terminal serratures chiefly mucronato-spinose, veins more or less forked, sori copious on the upper half of the frond general marginal, involucre rather small orbicular peltate soon becoming cup-shaped.—*Bl. En. Fil. Jav. p.* 164.

Hab. Tropical India, Java, *Blume, in Herb. Nostr., Thos. Lobb, De Vriese and Teijsmann*, n. 595. Singapore, *Sir W. Norris*; Moulmein, *Thos. Lobb, C. S. P. Parish*, n. 72 (very coriaceous, large scales of the stipes castaneous). Silhet and Assam, *Griffith*. Khasia, *Griffith*. Bhotan, *Griffith, Booth*. Ceylon, *Gardner*, n. 1099, 1102, 1367, *Thwaites*, n. 3275, *Hooker fil. and Thomson*, n. 276 c, *Simons*.—I long hesitated whether to unite this with *A. aculeatum*, or to keep it separate



(see under *A. aculeatum*, p. 20). It is certainly the *A. biaristatum* of Blume (so named perhaps from the paucity of the spinulose serratures), and I do not find it to be noticed by any other author. It seems constant to its character, in the broad base of the frond, the basal pinnæ being in general the longest, the sudden acuminations of the apex of the frond (not gradually tapering towards the apex), and the great tendency of the sori to be marginal.

34. *A. (Polystichum?) varium*, Sw.; caudex thick subrepent very scaly with long curved linear-subulate rigid chestnut-black very glossy scales, stipes 3 inches to a span high scaly as are the rachises with dark brown subulate rather rigid more or less deciduous scales long and more black and more persistent near the caudex where they are quite crinite often mixed with short ovate membranaceous ones, fronds from a span to a foot long subcoriaceous-membranaceous opaque on the surface broad-ovate suddenly acuminate bipinnate, lowest primary pair of pinnæ with the inferior basal pinnules elongated and deflexed (hence subpedate) and again pinnate all petiolate from a broad base lanceolate gradually acuminate, pinnules oblong sessile broad at the base often subfalcate obtuse (rarely in the most fertile specimens) acute pinnatifid or obtusely serrated towards the point, sori in two rows nearer the margin than the costule, involucre firm-membranaceous plane orbicular and peltate (aspidioid) or orbicular-cordate attached just within the sinus (lastreoid). (TAB. CCXXVI.)—*Sw. Syn. Fil.* p. 51. *Kze. Bot. Zeit.* vi. p. 571 (not Willd.). *Metten. Aspid.* p. 62. *Polypodium varium*, *Linn. Sp. Pl.* p. 1551. *Aspidium setosum*, *Sw. Syn. Fil.* p. 56. *Willd. Sp. Pl.* v. p. 271. *Langsd. and Fisch. p. 15. t. 17. Kze. Bot.* vi. p. 572. *Polystichum*, *Pr. Polypod.*, *Thunb. Fl. Jap.* p. 337. *Lastrea opaca*, *Hook. Kew Gard. Misc.* ix. p. 339, and in *Benth. Fl. Hongkong.* p. 456.

Hab. China, *Osbeck, Petersen*; Chusan and Tanglan, *Alexander*; Hongkong and Loochoo Islands, *C. Wright, Colonel Urukhart*. Japan, *Thunberg, Langsdorff, Babington*; Kinsin and Hakodadi, *C. Wright, U. S. N. P. Expl. Exped.* Nangasaki, *Miss Nelson*.—A very distinct species and yet not easily defined by words, and hence, though noticed in the days of Linnæus, little understood to the present time. It varies in the outline of the frond, sometimes broad and pedately divided at the base, the superior portion of the frond always suddenly acuminate. Occasionally I find the involucre lastreoid, but certainly generally aspidioid, as Langsdorff and Fischer describe and figure them. Their plate represents a more lax plant than is usual in this Fern, and the pinnules more acute.

35. *A. (Polystichum) Championi*, Benth.; "fronds broadly lanceolate twice pinnate, the stipes and rachis covered with brown lanceolate scales, lower pinnæ 4-5 inches long not

longer or more compound than the 2-3 next pairs which afterwards pass gradually into the short pinnatifid apex, segments lanceolate-falcate distinct sessile and broadly rounded at the base but not adnate seldom 1 inch long serrato-crenate or the lowest pinnatifid, the inner lowest lobe rather larger, veins scarcely conspicuous pinnate with forked veinlets, sori rather large in two rows on each segment, indusium peltate or rarely reniform." *Aspid.* (Lastrea) *Championi*, *Benth.* in *Fl. Hongkong.* p. 456. *Polystichum vestitum*?, *Hook.* in *Kew Gard. Misc.* ix. p. 339.

Hab. Hongkong, *Champion*, *Urquhart*, in *Herb. Nostr.*—"Not known out of the island. Colonel Urquhart's specimens are old, and Colonel Champion's too young. They evidently belong to *Lastrea*, and are allied to *Aspid. opacum* (varium, *nobis*), but differ in the scales and in the general shape of the frond as well as in that of the segments," *Benth.*—Unfortunately my specimens of this plant are mislaid, and I can offer no remarks other than Mr. Bentham has given, further than to say that the involucre, as stated by Mr. Bentham, being "peltate in both, with an occasionally indented sinus," I prefer retaining the two species, in the *Polystichum*-group, to which they naturally belong, rather than that of *Lastrea* (*Nephrodium, nobis*).

36. A. (*Polystichum*) *frondosum*, Low; caudex (sub-)repent, stipites 1-2 feet long angled when dry pale brown densely crinite below with long subulate ferruginous scales, rachises beneath with ovato-subulate smaller scales, fronds  $1\frac{1}{2}$ -2 feet long broad subtriangular-ovate coriaceous-membranaceous subglossy 3- below 4-pinnate, primary and secondary pinnæ long-petiolate ovato-lanceolate narrowly acuminate, pinnules all approximate oblong acute or subobovate sessile subdecurent mucronately serrate mostly on the upper margin about  $\frac{1}{4}$  of an inch long, sori biserial on the pinnules soon confluent, involucres large orbicular or subreniform peltate variously reflexed by the copious capsules.—*Low*, *Primit. Faun. et Fl. Mad.* p. 6. *Metten. Aspid.* p. 66. *Polypodium frondosum*, *Sol. MSS.* in *Herb. Banks.* *Polystichum*, *J. Sm. Cat. Cult. Ferns*, p. 60. *P. æmulum*, *Pr. Tent. Pterid.* p. 83. *Aspidium Webbianum*, *A. Braun*, *Flora*, 1841, p. 711 (*fide Metten.*). *Lastrea* (*fide Moore*).

Hab. Madeira, rocky places, R. de St. Jorge, elev. 3500 feet, *Masson*, *Low*, *Lemann*, etc.—This handsome species is, as far as I know, peculiar to the island of Madeira; not extending south to the Canary Islands, nor am I aware it has ever been seen on continental Africa. It is true that Mettenius gives "Canary Islands" as a locality, but there is no authority for it, that I am aware of, nor is it included in Webb's Fl. Can. It must rank near to the *coniifolium*-form of *Aspid. aristatum*, with which it has altogether the habit in stipes and fronds; but here the rachises beneath have rather copious bullate scales, terminating in a subulate point: such are never seen in *coniifolium*.

37. A. (*Polystichum*) *adscendens*, Hew.; caudex very long ("20-30 feet") scandent as thick as one's finger branched clothed with copious linear-subulate ferruginous fringed paleaceous scales, of two kinds from the same caudex, fronds 1-3-4 feet long by 2 feet wide in the broadest specimens thin-coriaceous (on stipites 1-2 feet long brown furrowed on one side scaly only at the base 3-4-pinnate); *sterile* ones, pinnæ all petiolate, primary ones ovato-lanceolate, secondary ones oblong-lanceolate acuminate, pinnules lanceolate very acute obliquely cuneate at the base inferior ones pinnatifid or rarely again pinnulate with short acute lobes their apices serrated penni-veined, veins prominent beneath; *fertile* fronds with pinnules all much contracted linear deeply pinnatifid with rounded lobes each bearing a sorus as large as itself and covered by an orbicular-cordate peltate involucre, rachises all glabrous. (TAB. CCXXIV.)—*Heward, in Mag. Nat. Hist. N. S. 1838, pp. 13, 454.*

Hab. Jamaica, mountain forests about "Old English plantation;" Manchester, climbing 20-30 feet up the trunks of trees, *R. Heward*. It is also sent from Manchester by *Purdie*, from Woodside, St. Mary's, by *Wilson*, and from Moneague by *Dr. Alexander Prior*.—This, which may be reckoned among the rarest, and at the same time the most distinct of known Ferns, was discovered by our friend Mr. Heward, and though accurately described by him in the *Nat. Hist. Journal* above mentioned, it has never been taken up by *Fée* or *Mettenius*. Its affinity is clearly with *Aspid. coriaceum*, from which however it is abundantly distinct, as will be at once seen by our specific character and figure. It is remarkable that though "common in the mountain forests, and the caudex climbing upon and over trees" to the extent it does, Mr. Heward only twice met with the sterile fronds. Most of our fronds, whether they are sterile or fertile, are very much larger than what came under his observation. Some of these sterile fronds are partially fertile, that is, their pinnules are changed into fertile ones. From the shape of the involucre this might almost claim to be a *Lastrea*, but the habit is that of a *Polystichum*.

38. A. (*Polystichum*) *coriaceum*, Sw.; caudex very long creeping branched as thick as one's finger densely clothed with large tawny silky subulate scales, stipites solitary distant 1-2 feet long stout and as well as the main rachises decidedly paleaceous, fronds generally very large from 6 inches to 2-3 feet long deltoideo-ovate acuminate very coriaceous rigid 3-pinnate, pinnæ all erecto-patent petiolate lower ones unequally deltoid acuminate, lowest inferior secondary pinnæ longer than the superior ones, pinnules an inch or more long ovate or lanceolate entire or more or less obtusely serrate or pinnatifid, segments oblong acute (but not mucronate) entire or bluntly serrated, ultimate ones of the primary

pinnæ confluent, veins sunk and dichotomously fascicled, veinlets close, sori in two rows nearer the costule than the margin, involucres large orbicular peltate with a more or less distinct sinus.—*Sw. Syn. Fil. p. 57. Willd. Sp. Pl. v. p. 268. Schk. Fil. p. 50. t. 50. Metten. Fil. Hort. Lips. p. 89. Aspid. p. 52. Polystichum, Schott. Pr. Brack. Polypodium, Sw. Fil. Ind. Occ. p. 1688. Tectaria, Lk. Hort. Berol. ii. p. 170. Hypopeltis, Bory in Belang. Voy. Bot. p. 70. Aspidium Capense, Willd. Sp. Pl. v. p. 267 (not Sw.). A. discolor, Langs. et Fisch. p. 16. t. 28. A. orientale, Desv. Polypod. Berteroanum, Spr. (not Aspid. Berteroanum, Coll.). P. adiantiforme, Forst. Prodr. p. 82. Tectaria Calahuala,\* Cav. Prælect. 1801, n. 61. Rumohrea aspidioides, Raddi, Fil. Brasil. p. 28. t. 43.*

Hab. Pacific Islands, *Forster*. New Zealand, *Banks and Solander, Menzies, A. Cunningham, Hook. fil.*, etc. Tasmania, *Brown, A. Cunningham, R. Gunn, Hook. fil.*, etc. S. Africa: Cape, frequent, and eastward to Uitenhage and Natal (our largest-growing living plants are from S. Africa). Tristan d'Aunha, *Carmichael*. Mauritius, *Wallich and others*; "Bourbon," Madagascar. S. America: Sierra de Tondil, Argentine Republic, *Tweedie*. S. Brazil, *Fox, n. 241; Sellow*; Minas Geraes, *Gardner, n. 5321*. W. Indies: Jamaica, *Swartz, Purdie*; Cuba, *C. Wright, n. 999*. British Guiana, *Schomburgk, n. 1151*. Cayenne, *Appin*. Chili, frequent, especially in the south; Valdivia, *Lechler, Bridges, n. 811*; Patagonia, Port St. Elea, *Capt. Ph. King*; Port Desire, 49° south, *Darwin*.—This plant varies extremely in size, with stipites from 6 inches to 3 feet long, and with fronds the same; the pinnules and pinnæ are more or less narrow, but the species is a very peculiar one, scarcely likely to be confounded with any other, singularly thick and fleshy in texture, when dry quite leathery, as its name implies. Its nearest affinity is with *Aspid. Berteroanum*, from which however it is abundantly different.

39. A. (Polystichum) *Berteroanum*, Colla; caudex stout long creeping densely clothed with long linear subulate almost black glossy scales, brown at the margin, stipites 6 inches to 1 foot long stout paleaceous with deciduous ferruginous membranaceous crisped scales mixed with some blacker and longer ones, fronds 6 inches to 1 and 2 feet long firm-coriaceous when dry dark-brown above paler and brown beneath and copiously paleaceo-squamulose (as are the rachises) broad triangular-ovate moderately acuminate bi- below often tri-pinnate, primary and secondary pinnæ long-petioled, pinnules sessile obliquely ovato-oblong obtuse decurrent at the base entire or crenato-lobate subauriculate, lobes partially and obtusely serrated, costules and veins prominent beneath, sori copious in two series on the pinnules and larger lobes between the costa and the margin, involucres orbicular peltate

\* Ex hoc venit "*Radix Calahuala*" officinalis, *Willd.*

firm red-brown very dark in the centre. (TAB. CCXXIX.)  
 —*Colla, Pl. Chil. fasc. ult. p. 42. t. 70.* *Aspid. flexum*,  
*Kze. Annal. Pteridogr. p. 44.*

Hab. Juan Fernandez, *Bertero, n. 1529*; "caudex creeping over stones and the roots of trees in woods," *Cuming, n. 1336, Douglas, Scouler*.—Allied to *A. coriaceum*, as it is also to the following, *Aspid. Seemannii*.

40. A. (*Polystichum*) *Seemannii*, Hook.; caudex? stipes? frond (in my solitary specimen) nearly  $1\frac{1}{2}$  foot long broad deltoideo-ovate acuminate bipinnate coriaceous, beneath on the rachises minutely subglanduloso-pubescent regularly bipinnate, primary pinnæ petiolate lower ones a span long distant, pinnules also distant  $\frac{1}{2}$  an inch to  $1\frac{1}{4}$  long, the largest petiolate oblong obtuse truncate but subauricled at the superior base lobato-pinnatifid, the lobes entire smaller and upper ones sessile subdecurent and entire or only slightly sinuated, costule beneath very prominent straight, veins pinnated with fine veinlets also prominent and flexuose, each veinlet soriferous at the apex, involucre convex subumbonate orbicular and peltate deciduous. (TAB. CCXXX.)

Hab. Bay of Arditia, tropical Pacific America, *Seemann*.—I have seen only one specimen of this very distinct *Aspidium*, and this destitute of caudex and stipes, which will be found probably to resemble those of *A. coriaceum* and *Berteroanum*, to which group this plant undoubtedly belongs. The venation is very peculiar, and the frond seems to be quite destitute of scales.

41. A. (*Polystichum*) *melanostictum*, Kze.; "frond large ovato-acuminate submembranaceous paler beneath bipinnato-pinnatifid pinnato-pinnatifid at the apex, pinnæ alternate remote petiolate erecto-patent lanceolato-acuminate, pinnules sessile decurrent at the base lanceolato-acuminate deeply pinnatifid, segments oblong subfalcate acute coarsely serrated or incised cuneate at the base, sori numerous between the costule and the margin arranged in a line round plane at length spreading, involucre orbicular persistent cinnamon-coloured the disk black, stipes and rachises sulcate paleaceous hairy, costæ and costules hairy above paleaceous beneath." (TAB. CCXXXIII. A.) *Kze. in Linnæa, xiii. p. 148. Mart. et Gal. Fil. Mex. p. 68. Metten. Aspid. p. 73. Fée, Fil. xix. Mém. p. 22. Polystichum, Liebm. Fil. Mex. p. 124. Aspid. extensum, Fée, Gen. Fil. p. 295.*

Hab. Mexico: Cuesta grande de Chicaniquaco, temperate region, *Schiede*; Xalapa, *Galleotti, n. 6320, Harris*.—My specimens, though otherwise very perfect, are, like those of Kunze, destitute of caudex and stipes. The author describes it as "species insignis habitu *Aspid. catopteri* mihi (*Lastrea lanuginosa*,

Moore), sed characteribus abunde distinctum." It has nothing of the usual habit of *Polystichum*, and may very well rank next the following species, *Aspid. melano-chlamys*. In both of these my specimens possess the involucre of *Polystichum*. The present species is almost black when dry.

42. A. (*Polystichum*) *melano-chlamys*, Fée; caudex stout suberect clothed with silky long subulate purplish-brown soft membranaceous scales, stipites tufted (?) a span to a foot long crinite with long spreading setaceous scales such as clothe the caudex but shorter and which appear on the rachises too, fronds  $1\frac{1}{2}$ –1 foot long oblong remotely bipinnate membranaceous green when dry, primary pinnæ 4–5 inches long oblong-acuminate sessile adnate and subdecurent, pinnales about an inch long obtuse often broadest upwards lobato-pinnatifid, lowest small obtuse quite entire monosorous rarely disorous, costules with minute bullate scales beneath, veins few pinnate, sori often confined to two or three of the lower lobes sometimes on all, involucre orbicular black in the centre the margin castaneous. (TAB. CCXXXIII. B.)—*Fée, Gen. Fil. p. 294. Aspidium (Lastrea) melanostictum, Eaton, Fil. Wright. et Fendl. p. 209 (who also quotes as syn. A. melano-chlamys, Fée). Lastrea melano-chlamys, Moore.*

Hab. Cuba, Mont Liban, *Linden, n. 1865, in Herb. Nostr.* Eastern Cuba, near the town of Monte Verde, *C. Wright*.—Fée well observes of this: "Fili squamosa, distinctissima, partitionibus omnibus remotis, indusio centro nigrescente, in ambitu rufescente notata." That its near affinity is with the preceding is however quite certain; but I think Mr. Eaton is in error in considering them the same. *A. melanostictum* is a native of Mexico, of large dimensions, with crowded pinnæ and pinnales, black when dry, with much larger and toothed or incised segments, with several sori on a segment: and though it is true we are not acquainted with the stipes so as to say if that is densely crinite as in the present species, yet the entire absence of the same clothing on the upper part of the stipes and on the rachises, would lead to the conclusion that the whole plant was free from them. Here the soft hair-like scales are frequent on the rachises.

43. A. (*Polystichum*) *multifidum*, Mett.; caudex robust horizontal densely clothed with long subulate dark ferruginous scales, stipites a span to a foot long stout, at the very base clothed with the same ferruginous scales, higher up with these are mixed very large broad-ovate intensely black firm scales subulate at the point castaneous at the margin full  $\frac{3}{4}$  of an inch long, the rest of the stipes and the very stout rachises are almost shaggy with copious narrow-subulate tawny scales mixed with the black but of a smaller size, fronds  $1\frac{1}{2}$ –2 feet long oblong-lanceolate subcoriaceous-membranaceous 3-subquadripinnate, primary pinnæ about 4 inches long horizontal oblong acuminate sessile, secondary and tertiary ones



sessile obliquely ovate obtuse decurrent at the base pinnatifid chiefly at the superior margin or again pinnate, ultimate pinnæ or segments small short obtuse or acute, veins solitary or forked, sori dorsal one near the base of the lobe or pin-nule, involucre peltate.—*Metten. Fil. Lechl. Chil. et Per.* p. 20. t. 3. ff. 14-17.

Hab. Peru, watercourses; Sichabue, Cordill. de Ranco, *Lechler, n.* 3060.—A rare and extremely well-marked species, of which portions are well represented by Mettenius, *l. c.* The fronds are more compound than in *Aspid. melanochlamys*, which is perhaps its nearest ally.

44. A. (*Polystichum*) *fœniculaceum*, Hook.; caudex stout creeping densely clothed with tawny satiny ovate-acuminate paleaceous scales, stipites a span to a foot long stout below and there paleaceous like the caudex, fronds pergamentaceous glossy translucent when fresh 1-2 feet and more long ob-long-ovate acuminate supradecomponently pinnate, primary pinnæ (inferior ones) from 4 inches to almost a foot long long-petioled ovate finely acuminate, secondary ones 1-3 inches long also petioled, these are broken up into a succession of smaller and lesser pinnæ or pinnules and all finely cut into linear acute obscurely costate segments simple or once or twice forked or having a lateral short tooth which generally bears the solitary rather small sorus, sori globose as broad as the segment or tooth, involucre small dark-brown convex peltate of a subcoriaceous texture, rachises with a few scattered flexuose setæ. (TAB. CCXXXVII.)

Hab. North-eastern India: Chola, Sikkim, alt. 8-10,000 feet, *Hook. fil. and Thomson, n.* 274.—This is perhaps the most remarkable of all the polystichoid *Aspidia*, and one of the most elegant, if the plant be in its normal state. Mr. Moore throws some doubts on this by naming Dr. Hooker's specimens as "*Lastrea* (*Polystichum*, nobis) *aristata*,  $\gamma$  *dissecta*," while Mr. J. Smith considers them as a variety of the West Indian *Aspidium denticulatum*, Sw. In regard to the first of these opinions, the fronds have not the outline of that species (*aristatum*), and unless I could see intermediate states in the form of the pinnæ and pinnules, I can hardly credit such a transformation. All Dr. Hooker's numerous specimens are very uniform in the finely cut fronds, and nearly all have copious fructification. As to its being the West Indian *A. denticulatum*, I am not prepared to agree to such a union, but there certainly is a very common form of the latter plant which is very closely allied to it.

§ CYCLODIUM.—Primary veins pinnated, opposite branches uniting at an angle and sending out a free veinlet in the areole above; pinnæ of the fertile frond contracted. (HOOK. GEN. FIL. TAB. XLIX. C.)

45. A. (*Cyclodium*) *meniscioides*, Willd.; caudex stout as-cendant or creeping scaly, stipites stout glossy brown 1-2

and more feet long clothed with brown paleaceous scales at the base, fronds 2-3 feet long oblong coriaceous pinnated, pinnæ numerous, terminal one similar to the rest; *sterile* ones oblong acuminate unequally and obtusely cuneate at the base subsessile entire or sinuate or crenated 6-7 inches long; *fertile* ones smaller and much narrower oblong-lanceolate entire or sinuato-dentate.—*Willd. Sp. Pl.* v. p. 218. *Kaulf. Metten. Aspid.* p. 32. *Cyclodium*, *Pr. Tent. Pterid.* p. 85. t. 2. f. 20. *Epimel. Bot.* p. 59. *Moore, Ind. Fil.* p. 275. *Cyclodium confertum*, *Pr. Tent. Pterid.* p. 85. *Epimel. Bot.* p. 59. *Aspidium*, *Klfs. En. Fil.* p. 232 (*excluding the Indian plant*). *Hook. and Grev. Ic. Fil.* t. 121 (*excellent, but incomplete in the venation*). *Metten. Aspid.* p. 32. *Aspidium Hookeri*, *Kl. in Linnæa*, xx. p. 364. *Soromanes integrifolia*, *Fée, Acrost.* p. 82. t. 42 (*sterile frond only*).

Hab. Tropical America, chiefly however in Brazil and Guiana, *all collectors*, and extending as far westward as Tarapota, Eastern Peru, *Spruce, n.* 4736 and 4089. From Brazil we possess fine specimens from Uaupés, *n.* 2776; Pará, *Spruce, n.* 25, 26, (one specimen with the fertile pinnæ not contracted), *Gardner, Milne*; Illinois, *Moricand* (fertile and sterile pinnæ on the same frond), Guiana, *Le Prieur*; Surinam, *from Herb. Miquel*, fertile pinnæ pinnatifido-dentate, *Sagot, n.* 722, *Appin, n.* 160, 164, and 166, superior pinnæ contracted in the upper half only, and there fertile; Berbice, *Schomburgk, n.* 316; Trinidad, *Purdie*.—A very fine and well marked species. Kaulfuss is probably incorrect in referring to this *A. meniscioides*, a Fern of Tranquebar and of the island of Guaham, especially when he says of it that the lowest pinnæ are "bifid." He probably quite misunderstood Willdenow's plant, and thence was led to make a distinct species of the Cayenne plant, his *A. confertum*. The venation is variable, and the united branchlets or venules occasionally are prolonged into a free veinlet, which sometimes extends to the union of the pair above, and sometimes it is altogether wanting; the primary veins are stouter and more horizontal in the fertile than in the sterile pinnæ.

Obs. *Cyclodium Cumingianum*, *Moore (Anisacampium, Pr., Aspidium Otaria, Kze. in Metten., Gonopteris aristata, Fée)*, having the involucre of *Nephrodium*, *Rich. Br.*, I place it in that genus, the venation is that of *Nephrodium*, *Schott, § Pleocenemia. Cyclodium acrostichoides, J. Sm.*, also belongs to the *Nephrodium*-group. *Cyclodium heterodon* of Brazil (*Aspid.*, *Schrad.*) is unknown to me. *Moore* refers it to *Polystichum* in his 'Index Filicum,' p. 93, as *Presl* had done in his *Epim.*, but he places it in *Cyclodium* at p. 275 of the same work. May it not be our *Aspidium (Cyrtomium) abbreviatum*?

§ CYRTOMIUM.—Primary veins pinnated; the branches or veinlets more or less united, forming acute angles, often quite free; sori dorsal on the free or united veins; fronds sterile and fertile uniform or nearly so. When the venation is all free, as in some specimens of this section, it does not differ from § *Polystichum*.

46. A. (*Cyrtomium*) *abbreviatum*, *Schrad.*; caudex creeping scaly at the extremity with brown subulate scales, stipites distant pale brown a little scaly at the base, fronds 1-2 feet

high coriaceous-membranaceous pinnated pinnatifid at the apex, pinnæ numerous shortly petiolate 3-6-8 inches and more long lanceolate acuminate entire or crenate or lobate at the margin the apices strongly serrated varying in breadth from  $\frac{1}{2}$  an inch to an inch the lower half sometimes in the middle suddenly of one and the same pinna deeply pinnatifid even to the rachis with oblong or linear segments, venation exceedingly variable, primary veins sometimes pinnated the branches often free throughout or the lowest opposite pair only is combined or nearly all meet and join so as to form an irregular network between the costa and the margin, all the veins more or less fertile, sori irregularly biseriate between the primary veins. (TAB. CCXXXIV.)—*Schrad. Gött. Gel. Anz.* 1824, p. 809. *Kunze, Flora*, 1839, p. 332, note. *Metten. Aspid.* p. 33. *Nephrodium, Fée, Gen. Fil.* p. 306. *Polystichum, Pr. Epimel. Bot.* p. 58. *J. Sm. in Hook. Lond. Journ. Bot.* i. p. 199. *Cyclodium, Pr. Epimel. Bot.* p. 200. *Aspid. (Polyst.) Guianense, Kl. in Linnæa*, xx. p. 364 ("differt ab *A. abbreviato*, *Schrad.*, *venis ramosis, ramis omnibus liberis*").

Hab. Tropical Eastern America: British Guiana, *Parker, Appim.* n. 177 (one specimen with the lower portion of some of the pinnæ pinnatifid to the rachis), *R. Schomburgk*, n. 1157; Brazil, Bahia, *Wetherell*; Ilhios, *Moricand*, n. 2208; Rio, Corcovado, *Gardner*, n. 5671. Pernambuco, n. 1218; New Granada, Rio Hacha, elev. 9000 feet, *Schlim*, n. 856; Jamaica, *Wilson*.—The varied venation of this plant will afford characters for almost as many different species, if not genera, as there are specimens.

47. *A. (Cyrtomium) juglandifolium*, Kze.; caudex stout erect very scaly with large brown ovate or lanceolate scales darker in the centre, stipites 1-2 feet long stramineous equally scaly with the caudex while young, scales patent or reflexed, fronds 1-2 feet and more long firm-coriaceous ovate or oblong pinnated, pinnæ 2-10 pairs distant petiolate often scaly at the setting-on of the petiole, terminal one long-petioled, ovato-lanceolate or lanceolate or oblong subfalcate more or less serrated acuminate 4-6 inches and more long 1-2 inches broad the base obtuse sometimes unequally short-cuneate, primary veins copious horizontally patent slender pinnated, the branches or veinlets sometimes all free but generally more or less united so as to form elongated areoles which generally include a free or united veinlet, sori dorsal forming several series on each side the costa less regular and more scattered as they approach the margin.—*Kze. in Linnæa*,

xx. p. 363. *Metten. Fil. Hort. Lips. p. 87. t. 22. f. 6, 7, and 7 b. Aspid. p. 35. Amblia, Pr. Fée, Gen. Fil. p. 248. t. 22 B. f. 1. Cyrtomium, Moore, Ind. Fil. p. 277. Phanerophlebia, J. Sm. Polypodium, H. B. K. Nov. Gen. Am. i. p. 10, vii. t. 665. Willd. Sp. Pl. v. p. 195. Mart. et Gal. Fil. Mex. p. 40. Amblia latifolia, Fée. 8me Mém. pp. 101, 133. Aspidium nobile, Schlecht. in Linnæa, v. p. 610. Kze. in Schk. Fil. Suppl. i. p. 155. t. 67. Metten. Aspid. p. 37. Cyrtomium, Moore. Phanerophlebia, Pr. Tent. Pterid. p. 85. t. 2. f. 19. Fée, Gen. Fil. t. 22 B. f. 2. Hook. Gen. Fil. t. 49 A. J. Sm. Aspid. pumilum, Mart. et Gal. p. 64. t. 17. f. 1. Phanerophlebia, Fée.*

Hab. Mexico and the northern parts of tropical S. America. The following localities are from my herbarium:—Mexico, *Linden*, n. 1551 and 1552 (small, triphyllous, but fertile); *Galeotti*, n. 6243 (with twenty-one oblong-lanceolate pinnæ), 6554, *Dr. Coulter*, n. 1712 and 1713, *Liebmann* (*Phanerophlebia nobilis*); Guatemala, *Skinner*, one specimen with pinnæ 10 inches long; Caraccas, *Linden*, n. 164, *Birschel*, and ex *Herb. Miquel*, n. 201, *Otto*, n. 644; Venezuela, *Funck*, n. 211, *Fendler*, n. 233.—Ever since I possessed sufficiently copious specimens of this plant, I have in vain endeavoured to detect any character which can justify their being separated into species; nor do any descriptions and figures I have seen, appear to me to warrant such a conclusion. It is quite certain that, as in others of this group, the venation is variable, often on one and the same plant. The error was perhaps encouraged by Presl's placing them in two different genera in his Tentamen. His genus *Amblia* is the same as *Phanerophlebia*, the involucre having fallen from the latter.

48. A. (*Cyrtomium*) *caducum*, Wall.; caudex suberect stout, stipites a foot and more long stramineous very paleaceous with black large lanceolate scales below with a brown edge above these are broader membranaceous lax brown ones, fronds coriaceous 1–1½ foot long broad-lanceolate acuminate pinnated (or subbipinnate), pinnæ numerous 3–5 inches long ½ an inch to an inch wide falcato-lanceolate acuminate unequally so at the base, superior base truncated and dilated with a more or less distinct obtuse or acute auricle acutely subaristato-serrated not unfrequently lobato-pinnatifid and in some inferior pinnæ quite pinnated with obovate rather obtuse pinnules, veins copious approximate erecto-patent pinnate free or with the veinlets more or less combined forming elongated areoles generally including a long free veinlet and sometimes the whole frond is bipinnate and the veinlets are then always free, and the plant has no very distant resemblance to some forms of *Aspid.* (*Polystichum*) *aculeatum*, sori large scattered, involucre very conspicuous orbicular peltate but sometimes with a small sinus.—*Wall.*

*Cat. n.* 381. *Hook. et Grev. Ic. Fil. t.* 171. *Metten. Aspid. p.* 35. *Cyrtomium, Pr. Tent. Pterid. p.* 77. *Moore, Ind. Fil. p.* 276 (excluding the *S. American stations*). *Lastrea Hookeriana, Pr. Tent. Pterid. p.* 77.

Hab. North of India, frequent; Nepal, *Wallich*; Sikkim, Khasya, Assam, and Bhotan, *Griffith, Hook. fil. and Thomson*.—Mettenius remarks, "Species fortasse ad *Phegopteridem amandanda*;" but unmistakable involucre are seen on our specimens. The *S. American* specimens noticed by Mr. Moore, in my herbarium, from Ecuador (*Jameson*), I am satisfied, possess no involucre; nevertheless they have the partially anastomosing venation of our present plant, and the fronds equally vary from pinnate to bipinnate, the latter form approaches some states of *Aspid. platyphyllum*, Willd., *Phegopteris*, Metten. All have a true polystichoid habit.

49. A. (*Cyrtomium*) *falcatum*, Sw.; caudex short stout erect, stipites tufted a span to a foot long very paleaceous with large ovate setoso-acuminate membranaceous glossy scales, fronds 1-2 feet and more long coriaceous rigid glossy oblongo-lanceolate pinnated, pinnæ ovate acuminate more or less falcate petiolate repand at the margins which are sometimes serrated, inferior base cuneate superior produced rounded subtruncate, veins variously and irregularly anastomosing, costal areoles the largest generally including one free vein (those nearer the margin with two or three veinlets) clubbed at the apex and bearing a sorus on the back, involucre orbicular peltate membranaceous firm with a central brown umbo.—*Sw. Syn. Fil. p.* 43. *Willd. Sp. Pl. v. p.* 218. *Langsd. et Fisch. Ic. Fil. p.* 13. *t.* 15. *Hook. and Arn. Bot. of Beech. Voy. p.* 274. *Kze. in Bot. Zeit.* 1848, *p.* 558. *Benth. Fl. Hongkong. p.* 454. *Metten. Aspid. p.* 34. *Hook. Fil. Exot. t.* 92 (excl. *syn. Pappe and Raws.*). *Cyrtomium, Pr. Tent. Pterid. p.* 86. *Hook. Florul. Hongkong. in Journ. Bot. ix. p.* 340. *Polypodium, Thunb. Fl. Jap. p.* 336. *t.* 36.

Hab. Japan (mountains of Nangasaki, etc.), *Thunberg, Langsdorff, Miss Nelson, Babington, Oldham*; Amahirima, *J. Smead*; Nippon, *Mr. Consul Atcock*; China and adjacent islands, Loochoo, Bonin, etc., *Alexander, Hinds, Lay and Collie, C. Wright, Wilford*.—Apparently common in the Chinese and Japanese seas.

50. A. (*Cyrtomium*) *caryotideum*, Wall.; caudex short thick erect densely paleaceous with large erect scales, stipites tufted 10-12 inches long very scaly below, fronds  $\frac{1}{2}$  a foot to 2 feet long oblong subcoriaceous-carnose (when recent) of a pale yellowish-green colour opaque (not glossy) pinnated, pinnæ 3-4 or 6 inches long petiolate ovate much acuminate (sometimes repando-lobate) falcate sharply serrated, superior base

much broader than the inferior generally extended into a long sharp acuminate appendage or ear, the lowest pair and terminal pinnæ often with one on each side, veins anastomosing pinnate flexuose, costal areoles with a solitary soriferous free veinlet, superior ones with two or three veinlets clavate at their apex, sori scattered or subseriate, involucre orbicular peltate entire or laciniated at the margin, rachis and rather short petioles setaceo-paleaceous.—*Wall. Cat. n. 376. Hook. et Grev. Ic. Fil. t. 69. Metten. Aspid. p. 32. Hook. Gard. Ferns, t. 13. Cyrtomium, Pr. Tent. Pterid. p. 86. t. 2. f. 26. Moore. Ind. Fil. 277. Aspid. anomophyllum, Zenk. Pl. Nilgh. t. 1 (identical with our plant). Metten. Aspid. p. 34. Cyrtomium caryotideum, β, Moore, Ind. l. c. C. falcatum, Pappe et Raws. Syn. Fil. Afr. Austr. p. 15.*

Hab. India, chiefly in mountain regions: Nepal, *Wallich*; Kumaon, *Griffith, Strachey and Winterbottom* (at Dwall, elev. 8200 feet), *Edgeworth, T. Thomson*; Bhotan, *Griffith, Booth*; Sikhim-Himalaya, *Hooker fil. and Thomson, n. 261*; above Simla, *Col. Bates*; Nilghiri, *Dr. Wight, n. 108, Sir F. Adams*; *Zenker, Hohenacker, in Pl. Nilgh. n. 919 and 913, M'Ivor*. South Africa: Natal, *Major Garden*; forests in Caffraria, *Captain Espinasse, 1856 (Rawson and Pappe)*.—Distinct as the Indian *A. caryotideum* may be from the Chinese and Japanese specimens of *A. falcatum*, I confess I have sometimes a difficulty in distinguishing them, especially in the dried state. The extremes of form are distinct enough in general appearance. The Cape species undoubtedly belongs to *caryotideum* rather than to *falcatum*. Of the normal state of this plant, and that which gave rise to its specific name of *Dr. Wallich*, the pinnæ have a good deal the form of the leaflets of *Caryota urens*.

51. Asp. (Cyrtomium) *Teijsmannianum*, Hook.; caudex? stipites a foot and more long sulcate slightly scaly below and as well as the rachis brown, fronds about a foot long very coriaceous when dry, (probably succulent when recent) pinnated, pinnæ about 9 subpetiolate especially the terminal one ovate smaller and narrower above long acuminate variously sinuated subincised, lateral ones with the inferior half more dilated (so as to be somewhat semioval) glabrous superior surface embossed from the fructifications beneath, primary veins spreading slightly flexuose united by transverse veinlets which anastomose, the secondary ones bearing the copious sori (in our specimens on every pinna) two upon each veinlet and forming two series between the primary veins not unfrequently confluent, involucre orbicular peltate subcoriaceous in age. (TAB. CCXXXVI.)

Hab. Isle of Poolu Pulang, on the west side of Sumatra, *E. J. Teijsmann (ex Herb. Miquel)*.—A very peculiar Fern, at first sight resembling a *Meniscium*, but the sori are globose and there are involucre orbicular and peltate. The shape of



the pinnae much resembles some forms of *Aspid.* (*Cyrtomium*) *falcatum*; but the venation is very different, and the terminal pinnae are not confluent.

52. A. (*Cyrtomium*) *nephrodioides*, Hook.; stipes a span and probably much more long sulcated as well as the rachis dirty straw-colour, frond 2 feet long ovate submembranaceous acuminate glabrous pinnated throughout, pinnae numerous spreading 3-6-8 inches long by 1 broad sessile from a broad base oblong-lanceolate uniformly and deeply pinnatifid three-quarters of the way down to the rachis into numerous subhorizontally patent oblong acute subfalcate segments obsoletely serrated  $\frac{1}{2}$  an inch long  $1\frac{1}{2}$  line wide slightly hirsute beneath and on the costules and veins which are very patent, the lowest pair of veins uniting and forming a single vein which is prolonged to the sinus of the segments, the rest, quite free, extend from the costule to the margin each bearing a sorus nearer to the margin than to the costule, involucre distinctly orbicular peltate very thin and membranaceous ochraceous dark brown in the centre the margin ciliated. (TAB. CCXXXV.)

Hab. Indian Archipelago, *Seemann*.—This is a very beautiful and most distinct Fern, brought home by Dr. Seemann on his return from the voyage of H. M. S. Herald, but which by some accident was omitted to be noticed by that author in his Botany of the Voyage. It has all the habit and venation (of the simplest kind) of *Eunephrodium* of Schott and many recent authors; but the involucre are perfectly orbicular and peltate.

§ EUASPIDIUM.\*—Primary veins arising from the costae generally straight, the rest variously and compoundly anastomosing, the areoles with or without free veinlets. Sori dorsal or terminal upon a free veinlet or compital. Involucre orbicular, or not unfrequently more or less cordate or hippocrepiform. Fronds often large, simple, pinnate or bi-tripinnate, or subpedately pinnate. *Aspidium*, J. Sm. in *Cult. Ferns* (not elsewhere). *Aspidium*, Schott, and *Sagenia*, Pr. *Bathmium* and *Cardiochloena*, Fée.

\* Fronds simple, undivided.

53. A. (*Euaspidium*) *Singaporianum*, Wall.; caudex more or less creeping very fibrous, stipites approximate sometimes tufted 6-12-14 inches long sparsely setosely subulato-palea-

\* By the term *Euaspidium* here, I mean the *Aspidium* of Schott, and of most modern authors who favour the great multiplication of Fern genera, none of them unfortunately taking the same views, nor working in harmony with others. Mettenius adopts Swartz's *Aspidium*, including *Nephrodium* of Michaux and Brown; in other words, making no distinction between orbiculari-peltate involucre and those which are cordate or reniform; and such is the difficulty of distinguishing in the present section between cordate and orbicular involucre, that I am, as it were, compelled to unite *Sagenia*, Pr., under the head of *Euaspidium*; and, indeed, it is the opinion of many that both kinds of involucre may be found on the

ceous, fronds 6–12 inches long firm membranaceo-coriaceous (dark brown when dry) ovate or oblong much acuminate at the apex suddenly or generally long decurrent at the base quite entire, costa prominent beneath, primary veins horizontally patent subfalcate united by transverse arched ones, the areoles of which enclose netted veinlets, the ultimate ones free; sori forming transverse arched lines in double rows between secondary (transverse) veins about six in each row, involucre orbicular peltate.—*Wall. Cat. n. 374. Hook. et Grev. Ic. Fil. t. 26. Kze. in Schk. Fil. Suppl. p. 15. t. 9. f. 1. Metten. Aspid. p. 127. Moore, Ind. Fil. p. 104. Podopeltis, Fée, Gen. Fil. p. 286. t. 23 A. Polypodium Phyllitidis, Roxb. in Calc. Journ. Nat. Hist. iv. p. 483 (Mr. Moore refers with a ? to this species, Aspid. lobulatum, Bl. En. Fil. p. 143, of which the author says, "affine Asp. Singaporiano")*.

Hab. Malay islands: Singapore, *Wallich, Seemann*; Penang, *Sir W. Norris* (one frond 18 inches long), *Hance*; Malacca, *Cuming, n. 403*.—An extremely distinct and very handsome species.

54. A. (*Euaspidium*) *plantagineum*, Griseb.; caudex creeping woody, stipites approximate stout 3–12 inches long (and as well as the costa beneath) paleaceous with dark brown patent deciduous lanceolate scales, fronds blackish-green firm-membranaceous a span to a foot long oval or broad-lanceolate or broad-oblancheolate entire or subsinuate obtuse generally emarginate and proliferous at the apex, the base more or less decurrent often very much so, thus forming a winged stipes, primary veins of the costa straight rather stout, secondary ones transverse and arcuate forming curved areoles which are filled up with anastomosing veinlets, ultimate ones free, sori forming two rather irregular series between each pair of primary veins with or without a peltate involucre.—*Griseb. Pl. Carib. p. 138. Metten. Aspid. p. 126. Eaton, Fil. Wright. et Fendl.*

same species, and even on one and the same specimen. The author of the genus *Sagenia* figures and describes it with the involucre "orbicular and peltate." Others endeavour to restrict *Sagenia* to those species with cordate involucre, and Moore says this affords the best mark of distinction; whereas Presl's chief distinguishing character depends on the free veinlets in the areoles of *Aspidium*; all united in *Sagenia*, whence the name, from *σάχηνη*, a net. Mr. J. Smith has, I think, pursued the wisest course, in his 'Catalogue of Cultivated Ferns,' by uniting the two, and embracing under "*Aspidium*," species with the varied venation and the two forms of involucre. Of two difficulties (and indeed in this case of twenty difficulties), we must endeavour to choose the least.—The species are not more easy of definition than these groups or subgenera, and the size of our plates does not allow of figures that would do justice to subjects so large as many of them are.

p. 211. *Polypodium*, Jacq. *Coll.* ii. p. 10. t. 3. f. 1. *Sw. Syn. Fil.* p. 29. *Willd. Sp. Pl.* v. p. 161. *Hook. Ex. Fl.* t. 114 (not *P. latifolium*, as quoted by Mettenius). *Dryomenis*, J. Sm. in *Seem. Bot. of the Herald*, p. 229. *Podopeltis*, Fée, *Gen.* p. 9. *Phymatodes*, Pr. *Bathmium macrocarpum* and *sinuatum*, Fée, *Gen. Fil.* pp. 287, 288. *Aspidium sinuatum*, Moore, *Ind. Fil.* p. 104. *Phum. Fil.* t. 129.

Hab. Mossy rocky places near water, tropical America: Martinique, St. Vincent, Dominica, *Plumier*, *Sieber*, n. 353, *Dr. Imray*, *L'Herminier*; French Guiana, *Leprieur* (fronds lobato-sinuate); Venezuela, *Fendler* (one specimen 2 feet 4 inches long, 6 inches wide; the margin slightly sinuate). Brazil; Amazon, Serra de São Gabriel, *Spruce*, n. 2189 (ordinary form oval, moderately decurrent at the base, or with rather broad lanceolate fronds very decurrent on the stipes); Tarapota, Eastern Peru, *Spruce*, n. 4648 (fronds obovate-lanceolate, very decurrent upon the stipes); Utria Bay, Pacific coast of Panama, *Seemann*, same form as *Spruce's* n. 4648.—My copious specimens from the West Indies and the continent of S. America, have satisfied me that the *Polypodium plantagineum*, Jacq., and our *Aspidium plantagineum*, are one and the same Fern, varying a good deal in outline, as above noted, and varying in the presence or absence of the involucre, whether from being quickly deciduous, or, as I apprehend, its entire suppression at times, it is hard to say.

\*\* *Fronds palmately 3-5-lobed or 3-5-foliolate.*

55. A. (*Euaspidium*) *angulatum*, J. Sm. MS.; caudex? stipes a span and more long ebeneous-chestnut as are the rachis and principal costæ beneath, frond cordate 12-15 inches long and nearly as much broad subcoriaceous-membranaceous glabrous palmately 5-cleft or 3-foliolate, lateral pinnae petiolate semiorbicular deeply but unequally 2-lobed, terminal pinna with a long petiole (4 inches long) very large orbicular in outline 7 inches broad deeply 3-lobed, middle lobe the largest, all the lobes broad-ovate suddenly and very sharply acuminate, margins entire, costæ three in the terminal pinna, two in the lateral ones prominent towards the base beneath, primary veins patent rather distant straight or only slightly curved, secondary ones forming zigzag arches connecting the primary ones, the rest of the venation copiously anastomosing and forming irregular areoles with free simple or forked and divaricating veinlets bearing the sori invariably at the apex, sori small very abundant and even crowded but not confluent scattered over the surface of the frond to the very margin, involucre minute (*J. Sm.*) not visible in my specimens, possibly none.—*Polypodium angulatum*, *Willd. Sp. Pl.* v. p. 185.

Hab. Java (*Willdenow*); Amboyna, *Barclay*, in *Herb. J. Smith*; Borneo, *Mr. Wallace*, in *Herb. Nostr.*, the palmately 5-fid form.—*Mr. Smith*, I cannot doubt,

is quite correct in referring this very fine and peculiar Fern to the *Polypodium angulatum* of Willdenow, for it well accords with the description: and surely Presl is in error in asserting that this Java plant of Willdenow, is identical with the West Indian "*Hemionitis maxima quinquefolia*" of Plumier, Fil. t. 146, and consequently the *Aspid. Plumieri*, Pr. (Reliq. Hænk. p. 20). Mettenius adopts the views of Presl, but quotes Plumier, t. 149 (instead perhaps of 146, for he elsewhere quotes t. 149 as probably a form of *Aspid. trifoliatum*). I only regret that our small pages will not allow us to do justice to a figure of a plant like this. I think I may venture to say it has no near affinity with the American Fern of Plumier, though, according to Kunze, that is found in Java by Zollinger (n. 2432).

56. A. (Euaspidium) *trifoliatum*, Sw.; caudex erect rather stout, stipites tufted a span to a foot long sparsely and deciduously paleaceous at the base, fronds glabrous or pubescent a span to a foot long cordato-acuminate coriaceo-membranaceous when young entire or 3-lobed, in maturity 3- (rarely 5-) foliolate, terminal pinna large ovato-oblong long-petiolate, the margins more or less deeply sinuated or pinnatifid, lateral ones short-petioled ovate long-acuminate bipartite, segments more or less falcate and sinuato-lobate or pinnatifid, the lowest pair of pinnæ with the inferior basal segment the longest all costate, primary veins patent slender more or less waved remote, the rest of the veins uniformly anastomosing with areoles having free simple or forked veinlets, sori large generally in two series near the primary veins, involucres orbicular peltate.—Sw. *Syn. Fil.* p. 43. *Schk. Fil.* p. 29. t. 28 and 28 b. *Willd. Sp. Pl.* v. p. 213. *Hook. Gen. Fil.* t. 33. *Schott, Gen. Fil.* t. 4. *Metten. Fil. Hort. Lips.* p. 95. t. 22. f. 10-12. *Aspid.* p. 126 (not A. *trifoliatum*, *Hook. Hongkong Ferns*, nor *Benth. Fl. Hongkong.*). *Aspid. heracleifolium*, *Willd. Sp. Pl.* v. p. 217, according to *Mettenius*. *Polypod. trifoliatum*, *Linn. Sp. Pl.* p. 1547. *Jacq. Ic. Rar.* iii. t. 638 (*excellent*). *Bathmium*, *Fée*. *Drynaria cordifolia*, *Fée*, and *Polypodium cordifolium*, *Mart. et Gal.*—*Plum. Fil.* t. 148 and 149<sup>p</sup> (according to *Mettenius*, which is *Aspid. fimbriatum*, *Willd.*). *Sloane, Jam.* i. t. 42.

Hab. Tropical America: West Indies: Bahama, *Fraser* (pentaphyllous); Martinique, Cuba, *C. Wright*, n. 835, *Otto*, n. 80 and 232 (small pinnæ deeply pinnatifid); Jamaica, Dominica, Guadeloupe, St. Vincent (var. *ampla*, frond 2 feet long, terminal pinna 8 inches wide, one specimen 5-foliate), *L. Guilding* (probably *Aspid. Plumieri*, Pr.). Tropical continental America: Venezuela, *Fendler*, n. 164, *Funck*, n. 239; Panama, *Seemann*, and Isle of Gorgona; Amazon, *Maniquiry*, *Spruce*, n. 1624; Guatemala, *Skinner*; Mexico, Vera Cruz, *Linden*, n. 29 (frond 5-foliate, *Galeotti*, n. 6312, thence approaching some states of *Aspid. macrophyllum*); Ecuador, n. 5726, *Spruce* (pentaphyllous); and Peru, *Matheus*.—In general the specimens of this species are very uniform; but some, large in size and exhibiting 5 pinnæ, I am puzzled to distinguish from *Aspid. macro-*

*phyllum*, unless the perfect involucre are present, which are quite orbicular and peltate in the present plant, in the other cordate, but with a broad point of attachment, which extends as far as, or beyond the disk.

\*\*\* *Fronds compound, 3-5-foliolate or more or less pinnate or bi-tripinnate, rachis often much winged.*

57. A. (*Euaspidium*) *calcareum*, Pr.; caudex subrepent, stipites approximate 4-6 inches long, fronds 6-14 inches long ovate-lanceolate long-acuminate coriaceous-membranaceous pinnate above bipinnate below, primary pinnæ distant long-petioled ovate acuminate again distantly pinnated below, the upper half pinnatifid with long lanceolate pinnatifid segments decurrent at the base, superior pinnæ corresponding with the pinnules just described the long narrow points all sinuated, upper part of the main rachis winged, veins reticulated with large costal areoles many of which have free veins within them, sori in the lobes of the margin of the segments solitary dorsal on the network or terminal on short free veinlets, involucre small orbicular peltate.—*Presl, Epimel. Bot. p. 63. Metten. Aspid. p. 120. t. 18. f. 1-3* (a good representation of a small specimen; my larger frond is more compound). *Sagenia calcarea, J. Sm. in Hook. Journ. Bot. iii. p. 410 (no description).*

Hab. Isle of Leyte. *Cuming, n. 310.*—Mr. Smith implies that he had under his eye more than one plant which he has called *Sagenia calcarea*. Dr. Mettenius's figure exhibits one of these, and which clearly indicates what he intends. It seems very different from any other of this difficult group.

(*The following species here brought under § EUASPIDIUM, 58-75 are for the most part referred to SAGENIA\* by Authors.*)

58. A. (*Euaspidium*) *Pica*, Desv.; caudex? stipes a span to a foot long and as well as the rachis and principal costæ beneath intensely ebeneous, frond cordate with a deep sinus puberulous firm coriaceous-membranaceous 6-18 inches long simple or trifid or 3-5-foliolate, lowest pair half-ovate bipartite or deeply pinnatifid in the lower margin, intermediate pair broad oblong-lanceolate more or less adnate at the base, terminal pinna very large petiolate subrhomboid trifid, the terminal segment large lobato-pinnatifid, primary veins springing from the costæ flexuose conspicuous, the rest of the venation anastomoses into hexagonal areoles with lesser ones within them including free short veinlets some of which

\* See foot-note at p. 42, in reference to the genus *Sagenia*.

bear sori, while other sori are dorsal on the united veins (compital) arranged in two series between the primary veins, involucre cordate.—*Desv. in Berl. Mag.* v. p. 319. *Metten. Aspid.* p. 122. *J. Sm. Cat. Cult. Ferns*, p. 52. *Sagenia, Moore.* *Aspid. trifoliatum, Sw. and Willd. and Wall. Cat. n. 205 (as regards the Mauritius plant).* *Bathmium ebeneum, Fée.* *Aspid. Telfairianum, Wall. Cat. n. 385.* An *Aspid. puberulum, Desv.?*

Hab. Mauritius, *Wallich, Telfair, Bojer, Sieber, Syn. Fil. n. 40, Carmichael; Bourbon, Herb. Mus. Paris, in Herb. Nostr., Bory.*—A fine handsome species, with intensely black polished stipes and rachis, and principal costæ beneath; long confounded with *Aspid. trifoliatum*, but very distinct and peculiar to Mauritius and Bourbon.

59. A. (*Euaspidium*) *alatum, Wall.*; caudex creeping?, stipites rather distant 1–2 feet long but winged a long way down sometimes almost to the base and there subulato-paleaceous, fronds subcoriaceous-membranaceous 2–3 feet and more long oblong deeply pinnatifid with 4–5 pairs of distant oblong (6–18 inches long and 1–2 wide) or strap-shaped acuminate segments, inferior ones entire or bipartite, primary veins horizontally patent slender, connected by transverse zigzag secondary ones forming areoles which include anastomosing veins with free veinlets, sori small very copious scattered without order arising from reticulations (hence compital) not extending to the margin, involucre small, but I believe rather cordate than orbicular peltate (as erroneously represented in  *Ic. Fil.*).—*Wall. Cat. n. 378. Hook. et Grev. Ic. Fil. t. 184. Moore, Ind. Fil. p. 85. Metten. Aspid. p. 123. t. 18. f. 1. Bathmium, Fée. Aspidium vastum, Bl. En. p. 142. Kze. Bot. Zeit. p. 462. Metten. Fil. Hort. Lips. p. 96. t. 22. f. 7. Sagenia, Moore.*

Hab. East Indies, mountains; Silhet, *Wallich*; and Khasya and Assam, *Griffiths, Hook. fil. and Thomson, n. 223.* Java, *Blume*; Malacca, *Griffith*; Singapore, *Sir W. Norris*; Borneo, *Low.*—A very fine species, very distinct from *A. pteropus*, its near ally.

60. A. (*Euaspidium*) *pteropus, Kze.*; caudex stout erect, stipites tufted short or (if you include the decurrent wing below the frond) 1–3 feet long stout partially scaly at the base, fronds 2–3 feet and more long firm-membranaceous subcoriaceous broad-oblong deeply pinnatifid with 3–4 or 6 pair of long (6 inches to 1 foot, 1 inch and more broad) oblong or oblong-lanceolate more or less acuminate segments, lowest pair bi-tripartite at the inferior margin, terminal lobe often



trifid, the margin entire or more or less sinuate or pinnatifido- (not deeply) lobate, primary veins distant parallel flexuose, secondary ones transverse with these forming arched areoles which are occupied by anastomosing veins including copious free veinlets and two sori on short free veinlets, these sori form two lines or series between the primary veins, involucre on a large oblong receptacle rotundato-cordate persistent.—*Kze. Bot. Zeit.* iv. p. 462. *Metten. Aspid.* p. 120. *Sagenia*, *Moore.* *Aspid. decurrens*, *J. Sm. Journ. of Bot.* iii. p. 410 (name only), not *Pr. Reliq. Hænk.*, according to *Mettenius.* *Aspid. platynotus*, *Kze. in Linnaea*, xxiii. p. 229 (fide *Metten.*). *Cardiochlæna alata*, *Fée, Gen. Fil.* p. 315. *A. macrophyllum*, *Bl. En. Fil. Jav.* p. 144 (excl. syn.).

Hab. Malay Islands: Luzon, *Cuming*, n. 148 (segments copiously lobed); and Isle of Panay, *Cuming*, n. 356, segments numerous, quite entire; Java, *Blume, in Herb. Nostr.*; Borneo, *Low*; Sarawak, *Thos. Lobb*; Pula Bessar, *Griffith*; Chittagong, *Hook. fil. and Thomson.* Khasya and Assam, *Griffith, Simons.* Ceylon, *Mrs. Genl. Walker, Gardner, Thwaites.* Island of Formosa, *Wilford*, n. 474. Loochoo Islands, *C. Wright, Herb. of the U. S. N. Pacif. Expl. Exp.*; Pacific Islands, Aneiteum, *M. Gillivray and Milne.* Ovalau and Feejee, *Milne, Seemann*, n. 748, *Cairns.*— $\beta$ , segments 3-5, shorter and broader, more approximate. Brazil: woods in the Organ Mountains, n. 5947, and at Gongo-Soko, n. 5315.—A species in general habit and structure nearly allied to *A. alatum*, but having invariably only two rows of large sori between the primary veins. In this respect, as well as in others, our Brazilian specimens above noted, quite agree with the present species.

61. *A. (Sagenia) cicutarium*, Sw.; caudex stout ascending clothed at the apex with black subulate falcate scales, stipites more less tufted from 1-2 inches to a foot and a half long stramineous or castaneous or ebeneous scaly, scales lanceolato-subulate spreading deciduous, fronds 4-6 inches to 2-3 feet long oblong or ovate in the smaller and even fertile specimens quite membranaceous green when dry, larger ones coriaceous-membranaceous brown or black when dry, pinnate (young plants 3-foliolate) or below bi- and even tripinnate, the apex variously pinnatifid, pinnæ often opposite usually oblong sessile obtuse or acuminate variously lobed and pinnatifid often very unequally, lowest pair in the more simply pinnated forms semiovate at the inferior base pinnatifid with much longer segments than the rest of the pinnæ showing a disposition to become compound there, and in our largest specimens the lowest pair is not unfrequently pinnate (and sometimes the pair above) each division long-petioled and bearing pinnules resembling the superior pinnæ, segments everywhere more or less acute or

acuminate entire or lobate and pinnatifid, primary veins nearly straight, the rest variously anastomosing inappendiculate, sori in two series one on each side the costal vein of each segment compital (on the network of the veins) or terminating a veinlet within a large costal areole, involucres rotundato-reniform (scarcely hippocrepiform).—*Sw. in Schrad. Journ.* 1803, ii. p. 279. *Syn. Fil.* p. 51. *Willd. Sp. Pl.* v. p. 215 (*excl. the locality, "Virginia"*). *J. Sm. Cat. Cult. Ferns*, p. 52. *Metten. Aspid.* p. 117. *Fée, Gen. Fil.* p. 292. *Sagenia, Moore. Polypodium, Linn. Sp. Pl.* p. 1549. Polypod. appendiculatum, *Sw. Fl. Ind. Occ.* iii. p. 1677. Polypodium Hippocrepis, *Jacq. Ic. Rar.* iii. t. 641 (*excellent*). *Sw. Syn. Fil.* p. 51. *Willd. Sp. Pl.* p. 235. *Sagenia, Pr. Tent. Pterid.* t. 2. f. 24 and 25 (*excellent for the venation*). *Moore. Hook. Gen. Fil.* t. 53 *A. Brack. Fil. Un. St. Expl. Ex.* p. 181. *Aspid. coriandrifolium, Sw. Syn.* p. 51. *Nephrodium, Desv., and Pr. Reliq. Hænk. Polydictyum, Pr. Epimel. Bot. Plum. Fil.* t. 147 and 150 (*good*). *Aspidium dilaceratum, Kze. in Linnæa*, xxiii. p. 300? *Aspid. sinuatum, Labill. Austr. Caledon.* p. 1. t. 1 (*a broad-fronded var., referred by Mr. J. Smith and Mettenius to Aspid. apiifolium*). *Bathmum Billardieri, Fée, Gen. Fil.* p. 287. *Aspid. coadunatum, Wall. Cat. n.* 337. *Hook. et Grev. Ic. Fil.* t. 202. *Metten. Hort. Fil. Lips.* p. 94. t. 22. f. 3, 4. *Aspid.* p. 118. *Sagenia, J. Sm. Moore. S. macrodonta, Fée, Gen. Fil.* p. 213. t. 24 *A. f.* 1. *Aspid. devexum, Kze. Bot. Zeit.* vi. p. 259 (*Metten.*).

Var. *β. apiifolium*; pinnæ and pinnules distant copiously united by a broad wing of great length; stipites and rachis glossy ebeneous-black or castaneous.—*Aspid. apiifolium, Schk. Fil.* p. 128. t. 36 B. *J. Sm. Brack. Fil. U. St. Expl. Exp.* p. 182. *Metten. Aspid.* p. 120. *Nephrodium, Hook. and Arn. Bot. of Beech. Voy.* p. 313. *Microbrachys, Pr. Epim. Bot.* p. 52. *Aspidium sinuatum, Gaud. in Freyc. Voy. Bot.* p. 343.

Hab. Tropical America: West Indies, abundant probably in all the islands; Jamaica (*Hartweg, n.* 1585); Porto Rico, *Schwanecke*, sori immersed, sunk in a cavity (probably *A. dilaceratum* of Kunze: the same state is found by Mr. Wiles in Jamaica); and Mr. Purdie's specimens from thence have scaly gemmæ in the axils of the pinnæ. Mr. C. Wright's specimens from Cuba are especially variable, the var. *nanum*, for example, (n. 996) of Eaton, with perfectly fructified fronds 2-4 inches high, others a foot high (n. 995), and others (n. 833) 2-3 feet high. Guatemala, *Skinner (fronds broad-ovate and subtriangular)*. Mexico, *Galeotti, n.* 6484, *Liebm. in Herb. Nostr.* (*Aspid. latifolium, Pr.*). West coast of Panama and adjacent islands in the Pacific, *Seemann*. Ecuador, *Hinds*. Foot of Chimborazo, elev. 3000 feet, *Spruce* (only one specimen found). East Indies, appa-

rently throughout the continent, in hilly and mountainous districts, *Wallich*, *Griffith*, *Hooker fil.* and *Thomson*, n. 226 (Chittagong, etc.). Ceylon, *Gardner*, n. 1356, *Thwaites*, n. 3331 (stipes and costa ebeneous) Moulmein, *Parish*, *Lobb*. Java, *De Vriese and Teijsmann*, n. 269 (*fronds dark, many free veins*). Tropical Africa: Prince's Island, West Africa, *Barter* n. 1907. West Africa, south of the Line, *Curror*. Eastern Africa: Johanna Island, with large globose scaly gemmæ in the axils of the pinnæ, *Lieut. Speke*; Moramballa, elev. 300 feet, Zambesi, Livingstone's Exp., *Dr. Kirk*, with similar gemmæ copious on the costa, broad winged rachis, which unites the pinnæ and pinnules, and which in this respect brings this plant close to our *var. β*.

*β. apitifolium*. Sandwich Islands, *Gaudichaud*, *Lay and Collie*, *Barclay*, *Sinclair*. Sumatra, *Teschemacker*, in *Herb. Nostr.*—A very universally dispersed species in tropical regions in the Old and in the New World, but most difficult to define in words, because so variable. I am not satisfied with the result of my examinations; but can offer nothing better.

62. A. (*Euaspidium*) *giganteum*, Bl.; caudex? stipites 1–2 feet long brown as well as the rachises generally glossy, fronds ample 1–2 or more feet long submembranaceous dark greenish-brown when dry, pinnate with 4–5 pair of pinnæ below bipinnate, pinnæ numerous 4–5 pairs 6–12 inches and more long broad-lanceolate deeply pinnatifid, the uppermost ones gradually smaller and confluent into a pinnatifid apex, superior pinnæ generally having the basal segment decurrent upon the rachis, lowest pair of pinnæ (and base of the next pair) often very long a foot and more and again more or less pinnated, segments more or less acute or acuminate serrato-dentate or lobato-pinnatifid, veinlets forming oblong areoles near the costæ and costules then variously anastomosing in the pinnæ and partially in the segments, the veinlets in the segments nearly all free flexuose more or less divaricating and once or twice forked, areoles including free simple or forked *fertile* veinlets (rarely any *sterile* ones) and generally with a terminal sorus, within the segments the lowest veinlet on the superior side bears a terminal sorus, sori submarginal, involucre subcordate.—*Bl. En. Fil. Jav.* p. 159 (*and in Herb. Nostr.*). *Metten. Aspid.* p. 117. *Sagenia*, *Moore*. Polydictyum, *Pr.* *Aspidium intermedium*, *J. Sm. in Hook. Journ. Bot.* iii. p. 410 (*Mr. Moore considers this to be a var. of his Sagenia coadunata, Wall., our cicutarium, from which the venation and position of the sori are very different*).

Hab. Java, *Blume*. Isle of Leyte, *Cuming* (without a number in my set, apparently n. 9 in some sets), *Sir W. Norris* (stipes and rachis brownish-black, free forked veins only at the apex of the segments, lowest pair of pinnæ broader than usual, with the inferior basal pinnules larger and deflexed). Moulmein, *Thos. Lobb*, *Parish*, n. 86. Assam, *Simons*, n. 223, only a pair of inferior pinnæ 15 inches long and 5 inches broad. Ceylon, *Mrs. Genl. Walker*, *Gardner*, frequent.—*Var. minor?* Ceylon, *Thwaites*, n. 1358, and Java, *De Vriese and Teijsmann*, n. 299;

scarcely a foot long, others resembling the normal state.—I have been guided by an authentic specimen of this Fern from Dr. Blume, and refer hither the above synonyms and localities. The peculiar features of this species are its rather numerous pinnæ, of which the lower ones are very often again pinnated, and their deep segments more or less acuminate, and the nature of the venation together with the position of the sori. Next the costa (and, in the more compound pinnæ the costule) the veins anastomose, forming large areoles and small ones next to them; in these areoles are very rarely any sterile veinlets, often fertile ones terminated by a sorus (the sori being rarely compital); in the segments of the pinnæ the veins unite, and form areoles only near the base, one or more, rarely two, on each side the costule; above them the veins are somewhat pinnated, or once or twice forked and quite free, the sori here being solitary on a basal superior veinlet. The venation is indeed intermediate between *Sagenia* and *Pleocnemia*, approaching the latter in the paucity of anastomosing veinlets: and it is not a little remarkable that another Fern of Ceylon (where *A. giganteum* is far from unfrequent) bears so close a resemblance to this, that, but for its having *all free veins*, it might well pass for it: this I believe to be the *Aspid.* (§ *Lastrea*) *Gardnerianum* of Mettenius.

63. *A. (Euaspidium) latifolium*, Pr.; “fronds ovato-triangular bipinnate, pinnæ petiolate oblong-lanceolate acuminate, lowest ones bipinnatifid, superior ones confluent, segments ovato-oblong obtuse repando-dentate, sori solitary.”—Pr. *Reliq. Hænk.* i. p. 30 (not J. Sm.). *Tent. Pterid.* p. 87. t. 2. f. 23 (segment, with venation). *Metten. Aspid.* p. 118. *Sagenia*, Moore. *S. Mexicana*, Fée, *Gen. Fil.* p. 313.—*Var. rufescens*, *Metten. Aspid. rufescens*, Klfs. *Sagenia*, Pr. *S. latifolia*, β, Moore. *A. dilaceratum*, Kze. in *Linnaea*, xxiii. p. 300, in part (*Metten.*).

Hab. Mexico, *Hænke*, *Galeotti*, *Sartorius*; Guatemala, *Fredericksthal*; and Trinidad, *Sieber*, *Syn. Fil.* n. 187 (*Mettenius*).—This is quite unknown to me from any authentic source. Presl’s figure of the segment, including the venation (of which the areoles have no free veinlets), very much resembles that of *Aspid. cicutarium*, Sw. Presl indeed compares it with *apitfolium* (*A. cicutarium*, β, of us), and also with *Polypod. latifolium*, Forst. (our *A. melanocaulon*, Bl.). Mettenius says of this, “Differt ab *A. cicutario* lamina deltoidea, segmentis acuminatis, soris minutis, indusiis rotundato-reniformibus, ab *A. coadunato* (which I have ventured to unite with *A. cicutarium*) soris dorsalibus.”

64. *A. (Euaspidium) variolosum*, Wall.; caudex stout creeping, stipites approximate subcæspitose a span to 1–1½ foot long sparingly paleaceous at the base, fronds coriaceo-membranaceous a span to a foot and more long glabrous cordate or cordato-ovate acuminate trifoliate or more frequently pinnate with two or three nearly opposite pairs of pinnæ and a larger terminal one more or less petiolate, lowest pair large half-ovate bifid or bipartite or bifoliate, intermediate pairs lanceolate lobato-pinnatifid, inferior lobes the longest, terminal one subrhomboidal below deeply pinnatifid

with long acuminate entire or lobed segments, primary veins from the costa patent slender more or less waved remote, the rest of the veins uniformly anastomosing with areoles enclosing free simple or forked veinlets, sori scattered most copious near the margins of the pinnæ compital or more frequently terminal on a vein within a large areole.—*Wall. Cat. n. 379. Sagenia variolata, Moore? Aspidium coadunatum? (in part), Metten. Aspid. p. 281.*

Hab. India : Amherst, Tavoy and Penang, *Wallich, n. 379* ; Moulmein, *Parish, n. 6* ; Chittagong, *Hook. fil. and Thomson, n. 225* (two inferior pairs of pinnæ again pinnate) ; Mergui, *Griffith* ; Telyn, above Silhet, *Hook. fil. and Thomson, n. 225*.—Although I believe a good species and long known in herbaria, this has never yet been described. Mettenius has united it with *Aspid. coadunatum*, Wall., and Bentham, in Fl. Hongkong., has referred it to his *A. trifoliatum* (our *A. subtriphyllum*) ; but it has characters which induce me to keep it distinct.

65. (*Euaspidium*) *subtriphyllum*, Hook. ; caudex creeping and as well as the base of the stipites moderately scaly, stipites a span to  $1\frac{1}{2}$  or more long generally brownish, fronds glabrous or pubescent subcoriaceous-membranaceous, when young entire or 3-lobed cordate acuminate, in maturity 3-foliate or pinnate with five or seven pinnæ, terminal pinna large subrhomboid variously pinnatifid lower lobes the longest, intermediate ones sessile or petiolate oblong more or less acuminate, lowest pair distant large semiovate more or less acuminate and pinnatifid, lowest segments (especially at the inferior base) generally very much elongated patent or deflexed or not unfrequently (unless I am mistaken in the limits of species) the lowest pinnæ are pinnate and even subbipinnate, all costate, veins uniformly anastomosing with areoles having free simple or forked veinlets, sori scattered all compital (on the back of the anastomosing veins), involucre cordiform.—*Polypodium subtriphyllum, Hook. and Arn. Bot. of Beech. Voy. p. 256. t. 50. Aspidium trifoliatum, Hook. in Florul. Hongkong. Kew Gard. Misc. ix. p. 341. Benth. Fl. Hongkong. p. 450 (excl. syn. of A. variolosum, Wall.). Eat. in C. Wright, Herb. of U. St. Pacif. Expl. Exp. (in Herb. Nostr.). Drynaria latifolia, Brack. Fil. U. St. Expl. Exped. p. 50?*

Hab. China : Samla Bay, *Alexander, Lay and Collie* (Camoens Cave and elsewhere, frequent). Hongkong, *C. Wright, Col. Urquhart*. Moulmein, *Parish, n. 87* (very large, 3 feet high, lowest pair of pinnæ a foot long, on long petioles and again pinnated). Ceylon, small, *Gardner, n. 1300*. Tropical Africa : *Johanna Island, Lieut. Speke, large, and very much resembling n. 87 of Mr. Parish* ; Mauritius, *Telfair, Bouton*. Pacific Islands : *Frankland Islands, South Pacific?, McGillivray, Voy. of the Rattlesnake* ; *Island of Mallically, C. Moore* ; *Tahiti, Mathews, Barclay, Bidwill* (fronds large, pinnæ deeply pinnatifid), *Brackenridge*.

Tropical America : Panama, *Fendler*, n. 406 (*quite corresponding with the Tahiti specimens*) ; coast of Ecuador, *Lieut. Wood* ; and Bay of Utria, *Seemann*.—Whether or not all the specimens I have brought together here, from widely different countries, really constitute one and the same species, I must leave others to determine. The doing so has been at no small sacrifice of time and trouble. It is not myself alone, but Mr. Benthams, and Mr. Eaton, in the United States, all working independently of each other, have referred some states of this to *Aspid.* (*Euaspidium*) *trifoliatum*, usually considered a production of the New World only. It has sagenioid involucre and a creeping caudex. In general outline and external structure it entirely accords with Dr. Wallich's *Aspid. variolosum*, but the position of the sori is wholly at variance, here always *compital*, on the back of the anastomosing venation ; in *A. variolosum* the sori are usually terminal on free veinlets, each one within its own proper areole : a difference too striking to allow us to unite the two, and, indeed, more than sufficient in the opinion of many modern pteridologists to constitute generic distinctions. Still nearer does this Fern approach to the following species, *A. melanocaulon*, in the sori and their compital attachment, and perhaps the chief distinction will be found in the colour of the stipites and rachises, there intensely ebeneous-black and glossy, here a dull brown, and the colour of the frond, too, is there of a much brighter green when dry. Still on the latter circumstance no great stress can be laid, and under *A. melanocaulon* I have admitted some specimens with brown stipites, yet it does not appear to be the normal colour.

66. *A. (Euaspidium) melanocaulon*, Bl. ; caudex creeping ?, stipites a span to a foot and a half long scaly at the base and as well as the main and secondary and the base of the tertiary rachises especially beneath intensely ebeneous-black polished, fronds 1-2 feet long cordato-ovate coriaceous-membranaceous generally dark green (when dry) 3-nate or 5-nate or pinnate with 3-5 remote pairs and a large terminal one which is rhomboidal long-petioled deeply pinnatifid, the segments above confluent into a serrated acuminate apex, lateral pinnæ 5-6-8 inches long oblong acuminate variously pinnatifid, lowest pair of pinnæ large petiolate obliquely deltoid acuminate pinnatifid, inferior basal segments much the longest and often again lobato-pinnatifid, veinlets everywhere anastomosing, the areoles including free veinlets simple or forked, sori copious small always compital, involucre subcordate.—*Bl. En. Fil. Jav. p. 181. Sagenia, Moore. Aspidium latifolium, J. Sm. in Hook. Journ. Bot. iii. p. 410 (not Presl). Polypodium, Forst. Prodr. p. 83.\* Sw. Syn. Fil. p. 29 and 234. Schk. Fil. p. 19. t. 24. Willd. Aspid. Kze. Bot. Zeit. iv. p. 462. Metten. Aspid. p. 125 (excl. syn. Drynaria latifolia, Brack.). Aspid. cordifolium and microsorum, Pr. Cardiochlena subbipinnatifida, Fée, Gen. Fil. p. 341.*

\* A specimen in my possession from Forster's herbarium, has the stipes and rachises glossy indeed, as described by Forster ; but *pale brown* and exactly corresponding with my large and compound form of *Asp. subtriphyllum*.



Hab. Pacific Isles, *Forster*. Feejee and adjacent islands, *Milne, Seemann, n. 747 and 749* (named *Sagenia repanda*, in *Dr. Seemann's Cat. of Feejee Plants published in the 'Bonplandia'*), *Dr. Harvey*. Solomon's Group and Tanna, New Hebrides, *Milne*. Java, *Blume, in Herb. Nostr., De Vriese, and Teijsmann, n. 9 and 297*. Luzon, *Cuming, n. 57*. Madagascar, *Boivin*. Fernando Po, *Gustav Mann, n. 142* (one specimen with livid-brown stipes and rachis, but very glossy; also from the same place and with the same coloured yet glossy stipes and rachis, and from the Gaboon River, *G. Mann*.—Like so many of the *Sagenia*-group of *Aspidium*, this varies in the size and still more in the composition of its fronds, and the shape and nature of the pinnæ and their segments. It has altogether the venation of the preceding species, and there is much similarity in the fronds; but the generally intensely black stipites and rachises are very remarkable. Brackenridge, under his *Drynaria latifolia*, by his references intends this plant; but he expressly, in two places, describes the stipes as straw-colour, and as well as from the fact of his giving Tahiti as the locality, it is more than probable his Fern is the same as that from the same country, which I have referred to *Aspid. subtriphyllum*.

67. *A. (Euasplenium) polymorphum*, Wall.; caudex creeping, stipites from a few inches to 1–2 feet long fuscous a little scaly at the base, fronds very variable in size from 3–6 inches (when they are generally cordate or 3-lobed or trifoliate) to 1–2 or more feet long, adult coriaceous-membranaceous pinnated with 4–8 pairs of pinnæ and terminated by an odd one as large as or larger than the rest (sometimes confluent with the two below it), basal ones very large and long and generally unequally bifid or bipartite or more frequently bifoliate, the segments curved upwards, intermediate ones 5–6 or 8 inches long oblong acute or acuminate subopposite in distant pairs subpetiolate, inferior base unequal, the lowest often dilated, primary or costal veins horizontally patent slightly arcuate, these are connected by arched veins transversely, the meshes or areoles are occupied by copiously anastomosing veinlets, and their areoles with free sterile simple or forked veinlets, sori copious generally small all compital, involucre cordate.—*Aspidium polymorphum*, *Wall. Cat. n. 382*. *Moore, Ind. Fil. p. 100*. *Pr. Tent. Pterid. p. 88*. *J. Sm. in Hook. Journ. Bot. iv. p. 183*. *Aspid. rostratum*, *Wall. Cat. n. 383*. *Aspid. repandum*, *Willd. Sp. Pl. v. p. 216?* *Pr. Rel. Hænk. i. p. 29*. *Brack. Fil. U. St. Expl. Ex. p. 179?* *Bl. Enum. Fil. Jav. p. 144*. *Bathmium*, *Fée?* *Sagenia*, *J. Sm. in Hook. Journ. Bot. iii. p. 410*. *Aspid. rostratum*, *Wall. n. 383* (a common form, with narrow acuminate apices to the pinnæ).

Hab. India: Nepal, *Wallich, n. 382, Winterbottom*; Kumaon, elev. 2000 feet, *Strachey and Winterbottom*; Sikkim, *Hook. fil. and Thomson*, elev. 2–4000 feet; Bhotan and Mishmee, *Griffith*; Assam, Khasya, elev. 4000 feet (some with very large pinnæ laciniato-pinnatifid), *Griffith, Simons, Hook. fil. and Thomson*; Nil-

ghiri, *Wight, G. Thomson, Beddoe*; Chittagong, *Hook. fil. and Thomson*; Moulmein, *Parish, n. 145, 147, and 89* (var. *pentaphylla*); Troglia and Chittagong, *Wallich, n. 383*. Ava, *Griffith*. Pulo Pisang, Sumatra (sterile, but with copious scaly bulbs in the axils of the pinnæ). Borneo, Labuan, *Motley, Thos. Lobb* (one specimen quite undivided, others triphyllous). Ternate, *De Vriese and Teijsmann, n. 314*. Ceylon, *Mrs. Genl. Walker, Gardner, n. 1377, 1096*. Tropical Africa: Fernando Po, *G. Mann, n. 143*, quite the Indian form and texture, *Barter* (rather more coriaceous, darker coloured, uppermost pinnæ sometimes very decurrent and confluent).—A distinct and well-marked species, with something of the habit of *Aspid. macrophyllum*, but the terminal pinna is almost invariably quite free and petiolate (not confluent). The venation is very close, the areoles small, the free sterile veins numerous; sori copious, always compital, sometimes in two series between the primary costal veins, at other times irregularly scattered.

Specimens apparently of this species in my herbarium, with black stipes and main rachis, are marked, by Mr. Moore, "*A. polymorphum, β, ebenum*." They are from India: Tangree and Mishmee, *Griffith*; Assam, *Simons*.

68. *A. (Euaspidium) grande*, J. Sm.; stipes rufescent shining, "frond 2-3 feet long membranaceous glabrous sterile and fertile uniform ovato-oblong pinnated pinnatifid at the apex, pinnæ 5-6 pair 10 inches long  $2\frac{1}{2}$  wide oblong-lanceolate caudato-acuminate slightly sinuated, lowest ones petiolate cuneately attenuated and decurrent upon the petiole unequally bipartite attenuated at the base sessile or adnate with the inferior base, venation of *Drynaria*, the primary areoles on each side the costa of the segments 8-seriate bisorous, sori between the secondary costæ (primary veins, *nobis*) biseriate and approximate to them, rather large, terminal sori in the rays of the areoles, involucre reniform plane with a short sinus coriaceous." *Metten. J. Sm. in Hook. Journ. Bot. iii. p. 410. Metten. Aspid. p. 121. Sagenia, Moore. Aspid. grandifolium, Pr. Epim. p. 64. Cardiochlæna lævis and sinuosa, Fée, Gen. Fil. p. 316 (Mettenius).*

Hab. "Luzon?" *Cuming* (without number).—I find nothing in my herbarium entirely corresponding with the noble specimen of this Fern in Mr. Smith's herbarium. It is however well described by Mettenius. The frond is quite 3 feet long; the pinnæ are 10 inches long; habit and texture of large specimens of *Aspid. polymorphum*, but the terminal pinna is 3-lobed (or, in other words, composed of three confluent pinnæ). Some of the sori are arranged as in *Asp. pachyphyllum*, especially towards the apex of a pinna, that is, terminal on veinlets, and included within areoles; but the majority of them are compital. Mettenius says that *A. pachyphyllum* differs in its contracted fertile fronds.

69. *A. (Euaspidium) macrophyllum*, Sw.; caudex erect stout, stipites 1-2 feet long paleaceous below, fronds 2-3 feet long coriaceous-membranaceous glabrous or pubescenti-hirsute oblong or ovato-oblong acuminate pinnated, pinnæ spreading 4-6 pairs 6 inches to 2 feet long 1-2-3 inches wide suboppo-

site oblong acuminate entire or sinuate or subpinnatifid, lowest pair bipartite and subpetiolate, inferior segment falcate acute, upper pinnæ sessile and subdecurreut, terminal one generally subrhomboid more or less tripartite and pinnatifid (formed of three or more confluent ones), the base cuneate and decurrent, primary veins flexuose slender patent connected by irregular transverse ones of which the areoles are reticulated, with free veinlets in their areoles, sori terminal or dorsal often at the junction of veinlets forming two rows near the primary veins, involucre orbicular and subpeltate but with a narrow sinus hence cordate.—*Sw. Syn. Fil. p. 43 and 239. Willd. Sp. Pl. v. p. 217. Metten. Fil. Hort. Lips. p. 95. t. 22. f. 13 (venation). Aspid. p. 122. Sagenia, Moore. Bathmium, Link. Cardiochlæna, Fée, Gen. Fil. t. 24 B. 1 (venation and sori very good). Aspid. fraxinifolium, Schrad. A. bifidum, Pr. A. Pœppigii, Pr. ? and Metten. Aspid. p. 123. Plum. Fil. t. 145.*

Hab. Tropical America: Martinique, *Plumier*, and probably all the West Indian Islands; St. Vincent, Jamaica, Porto Rico, Cuba, *C. Wright*, n. 834; Dominica, Trinidad, Mexico, *Galeotti*, n. 6475, pinnæ small, lanceolate, *Liebmann, Jurgenson*, n. 767; Panama, *Hayes, Cuming*, n. 1289, *Fendler*, n. 407; Cupica, *Seemann*, n. 993, and Coyba (pinnæ much attenuated at the base and finely acuminate); Galapagos, *Lieut. Wood*; Guiana, *Le Prieur, Hostmann*, n. 239, *Appun*, n. 168 (basal pinnæ with a superior auricle at the base); Peru, *Ruiz and Pavon, Mathews*, n. 1825; Tarapota, *Spruce*, n. 3981; Ecuador, foot of Chimborazo, 3000 feet, n. 5724 and 5725, at elev. 4000 feet ("between 7 and 8 feet high; lowest pair of pinnæ  $1\frac{1}{2}$  foot long and  $4\frac{1}{2}$  inches wide; a noble Fern"), *Spruce*; Esmeraldas, *Seemann*; Quitinian Andes, banks of the Napo, *Jamieson*, with very narrow lanceolate pinnæ  $\frac{1}{2}$ – $\frac{3}{4}$  inch wide, and forest of Archedona (ordinary form); New Granada, *Schlim*, n. 62, 231, 640; Venezuela, *Fendler*, n. 165; Caracas, *Linden*, n. 159, 510; Brazil, *Sellow, Gardner*, n. 52.—This species has a very extensive range in tropical America, and varies much in size and in the form of its pinnæ and segments. *Plumier's* figure (t. 145) is a very faithful representation of the species.

70. A. (Euaspidium), *pachyphyllum*, Kze.; "frond ample subcoriaceous pubescenti-scabrous linear-oblong acuminate pinnate confluent at the apex, pinnæ shortly petiolate, sterile ones from an unequal base oblong-linear falcato-acuminate entire, lowest ones inciso-pinnatifid at the inferior margins, segments acuminate, costa prominent beneath, fertile ones subsessile narrower, sori among veins compoundly biseriate, rachis puberulous livid straw-colour, stipes long near the base paleaceous with large scales, scales linear-acuminate." *Kze. in Bot. Zeit. vi. p. 259. Metten. Fil. Hort. Lips. p. 95. t. 21 (sterile pinna and fertile frond). Aspid. p. 121. Sagenia, Moore. Aspidium fissum, Kze. Bot. Zeit. vi. p. 258 (accord-*

ing to garden specimens Mettenius says; the native plant of *A. fissum* being *Aspid. Menyanthidis*). *A. repandum*, *J. Sm. Cat. Cult. Ferns*, p. 52 (not of *J. Sm. Hook. Journ. Bot.* iii. p. 183, which is *Asp. Menyanthidis*). *Sagenia platyphylla*, *J. Sm. in Hook. Journ. Bot.* p. 410.

Hab. Java, *Zollinger*, n. 580 Z (*Kze.*). Philippine Islands, *Cuming*, n. 224, Mindanao, n. 290, Zebu, n. 339 and 340 (according to Mr. J. Smith). New Guinea, *Hindes*. Amboyna (*Delessert in Herb. Nostr.*). Feejee Islands, Ovalau, fertile pinnae broad, not evidently contracted, Naviti Levu, and Solomon's group, *Milne*. Moluccas, *De Vriese and Teijsmann*, n. 76 and 208.—My specimens from Cuming, as numbered from his catalogue, present very different appearances, but without figures I could hardly hope to render any notes upon them intelligible. In most, but not in all, the fertile fronds put on a very different appearance from the sterile ones; my n. 224 however is the most singular, 2-3 feet long, having the basal pinnae on the lower side deeply laciniato-pinnatifid with lanceolate segments 6 and 7 inches long.

Mettenius' figures admirably represent what may be considered the normal form of this species, especially in the venation and position of the sori. On this subject this author says: "Secondary" (primary with us) "veins costæform; tertiary conspicuous, constituting the primary areoles: the rest forming secondary, irregular, appendiculated areoles. Sori in two series between the secondary costæ, always terminal on the clavate apex of the anterior branch of the tertiary veins, the posterior branch more or less forked, free, or forming primary and also secondary areoles between the secondary costæ, regularly biseriate, and their areoles include the soriferous branches."—Accurate as this description may be in some specimens of this variable plant, it does not seem to hold good in all. Indeed, in alluding to Mr. Cuming's series of this very plant, Mr. Smith speaks of the variable character of the venation, according as the pinnae are more or less contracted.

71. *A. (Euaspidium) Menyanthidis*, Pr.; caudex? stipes a span to a foot long, frond oblong or subovate  $1\frac{1}{2}$  foot long (in my specimens) coriaceous-membranaceous pinnate, pinnae 10 inches to a foot long  $1-1\frac{1}{2}$  inch broad lanceolate finely acuminate entire or eroso-subsinuate below gradually tapering into a short petiole in the lowest pinnae, terminal one long-petiole uniform in my specimens all undivided ("lowest pinna abbreviated or bisected") costate, costa prominent beneath, primary costal veins patent subfalcate connected by flexuose transverse secondary veins whose areoles are occupied by anastomosing veinlets forming angles and including in their areoles numerous free simple or forked veinlets, sori copious small irregularly placed all compital, involucre "subrotund or oval fixed by the centre" (*Presl*; reniform, *Metten.*).—Pr. *Reliq. Hænk.* i. p. 28. *Metten. Aspid.* p. 124 (*excl. syn. Aspid. irriguum*,\* *J. Sm.*). *Sagenia*, *Moore*. *Polydictyum*, Pr. *Epim.*

\* This has little affinity with *Aspidium Menyanthidis*, and is *Microsorium trifidum*, Fée, Gen. Fil. p. 269, with the sori of *Dryomenis*, Fée.

*Aspid. repandum*, *J. Sm. in Hook. Journ. Bot.* iii. p. 410, *not Willd. (Pr.)*. Moore retains *J. Smith's irriguum* under *Aspidium* (*Euaspidium*) and refers to it *Microsorium trifidum*, *Fée, Gen. Fil.* p. 269. *Aspidium fissum*, *Kze. Bot. Zeit.* vi. p. 258.

Hab. Isle of Sorzogon, *Hanke*. *S. Camarines, Cuming*, n. 183 (*in Herb. Nostr. and n. 31*, according to *Mettenius*, *A. irriguum*, *J. Sm.*). Java, "*Zollinger*, 2368." —I possess only two fronds of this, n. 183 of *Cuming*. The venation and sori resemble those of *Aspid. polymorphum*, but the pinnæ are long and narrow, finely acuminate, and much attenuated at the base. Too near *Asp. pachyphyllum*.

72. A. (*Euaspidium*) *grandifolium*, *Metten.*; "fronds 2 feet long subcoriaceous at length nearly glabrous ovate pinnated, pinnæ about four pair opposite petiolulate from being ovate at the base long-tapering on the petiole, superior base cuneate oblongo-lanceolate acuminate entire or repandosinuate, lowest pinnæ unequally bifoliolate, the secondary segments superior smaller, inferior one larger, secondary veins (primary with us) at right-angles with the costæ curved near the margin, primary areoles especially of the superior fertile pinnæ narrow 12–15-seriate on each side regular, sori minute 3–4 between the costa, rarely 6–8-seriate, biseriate between the arched veins of the areoles, involucre reniform." —*Metten. Aspid.* p. 124. *Polypodium grandifolium*, *Wall. Cat.* n. 282. *Phymatodes*, *Pr. Tent. Pterid.* p. 198. *Pleopeltis*, *Moore, Ind. Fil.* p. 78. *Polypod. siifolium*, *Willd. Sp. Pl.* p. 196. *Aspid. Bl. Sagenia*, *Moore, Ind. Fil.* p. 93.

Hab. Nepal, *Wallich*, n. 282 (*Mettenius*).—Unknown to us. We should have been glad if the author, whose character we have given above, had made some observations on its affinities, which appear to be very dubious, to judge of the different genera in which it has been placed. *Blume* compares his *Aspid. siifolium* with his *A. sanctum*, a very little-known species, though from a garden specimen from Holland in my herbarium I suspect it to be a form of *Asp. pachyphyllum*.

73. A. (*Euaspidium*) *immersum*, *Hook.*; caudex? stipites 6–10 inches long and as well as the rachis stramineous, fronds broadly ovate scarcely acuminate 6–8 or 10 inches long subcoriaceous-membranaceous subbi- below tripinnate, primary pinnæ 5–7 obliquely ovate acuminate but obtuse in distant pairs long-petioled 2–4 inches long deeply and irregularly pinnatifid below pinnate, lowest pair at the base subpinnate, segments or ultimate pinnæ oblong obtuse sinuato-lobate at the margin, veins prominent anastomosing into suborbicular large areoles not more than two series in each segment, these are so depressed as to form a cavity (pustuled on the upper

surface) and each areolar cavity is occupied by a rather large sorus attached to the apex of a free veinlet, involucre rather large with a broad membranaceous margin orbicular and subpeltate but with a small sinus at the lower margin.—*Phlegbogonium impressum*, *Griff. Pl. Ind. n. 34* (according to *Fée*). *Fée, Gen. Fil. p. 314. t. 24 A. f. 2.* *Aspidium*, an *trifoliatum Sw.* (*Wall. MS.*)

Hab. India, *Wallich, in Herb. Nostr.*, no locality given.—*M. Fée* observes: "Cette fougère a un port spécial très-distinct de celui des autres *Aspidiées*;" this is very true, but to me this seems to be an abnormal state: a fertile frond unusually contracted and unnaturally irregular in outline, and with a good deal the habit of small contracted specimens of *Aspid. coadunatum*, *Wall.*, so that could we see the sterile fronds, they would perhaps exhibit the ordinary venation of *Sagenia*. My only two specimens are, as regards venation, quite uniform.

74. A. (*Euaspidium*) *semibipinnatum*, *Hook.*; caudex creeping scaly, stipites a span to foot high striated with prominent angles reddish-brown as well as the rachis and costæ, fronds 1-1½ foot long oblong-ovate in circumscription coriaceous-membranaceous dark brown when dry glabrous subbi-tripinnate, pinnæ 9-11 6-9 or 10 inches long linear-lanceolate subflexuose acuminate tapering at the base quite entire strongly costate, the lowest pair or two pairs long-petiolate tripartite or 3-foliolate sometimes again divided so as to be twice trifoliate, primary veins subhorizontal united by arches within the margin the rest variously anastomosing, the areoles appendiculate, sori (only young and imperfect) compital, involucre subreniform. (TAB. CCXXXI.)—*Polypodium semibipinnatum*, *Wall. Cat. n. 388 and 2229.*

Hab. Penang, *Wallich*. Borneo, *De Vriese and Teijsmann, n. 46.*—The only specimens I have seen of this rare and yet undescribed sagenioid *Aspidium*, are from Penang and from Borneo; the specimens are destitute of caudex, and are remarkable for the long, narrow, ribbon-like pinnules. The pinnæ are opposite or alternate, the lowest pair are compound and the divisions long-petioled. The venation is that of *Cardiochlena*, *Fée*, that is, with free veinlets in the areoles of the venation. I regret the fructification is very scanty and too young to enable me to form an idea of the perfect form of the involucre; probably it would be like that of *Aspid. Lobbii*, an allied yet very distinct species in the venation, etc.

75. A. (*Euaspidium*) *Lobbii*, *Hook.*; caudex?, stipites a span long tawny-brown subangular, fronds (the only two in my possession) 10 inches long subdeltoid in circumscription subcoriaceous-membranaceous dark brown above (when dry) paler and green beneath pinnate subbipinnate at the base, pinnæ spreading 5-6 inches long remote opposite narrow-lanceolate finely acuminate attenuated below subsessile quite entire costate, the costa much and densely pubescent above,



lowest pair of primary pinnæ compound with two or three pinnules resembling the superior pinnæ, primary veins erectopatent united by arches a little within the margin, the rest variously anastomosing and having no free veinlets in the areoles (inappendiculate), sori very copious scattered, apparently indiscriminately, over the whole under side of the pinnæ and pinnules moderately large, involucre permanent suborbicular and peltate but often exhibiting a shallow sinus as in *Sagenia* in general. (TAB. CCXXXII.)

Hab. Borneo, Sarawak, *Thos. Lobb*.—In outline and general aspect this comes near *Aspid. semibipinnatum*, Wall. (our n. 74); but it is less compound, has more spreading pinnæ and pinnules of a different colour, and the venation is considerably different, having no free veinlets.

Many supposed species of authors might be added to the *Euaspidium*- and *Sagenia*-groups, if such a list could be in any way instructive. One supposed *Aspidium*, however, from N. Granada, I am anxious to notice here, the "*A. dicranopterum*" of Mr. Eaton, in his '*Filices Wrightianæ et Fendlerianæ*.' The excellent description and a fragment which Mr. Eaton was so good as to send me from his only specimen, suffice to show that it is the same as a *Polypodium* (§ *Phymatodes*) in my possession, first detected by Mr. Purdie, in 1845, at the emerald-mines of Maso, N. Granada, specimens of which, including the stipes, are 6 feet long; and from Tarapota, Eastern Peru, n. 4065; and at foot of Chimborazo, alt. 3000 ft., in woods, n. 5723, *Spruce*.

### 3. NEPHRODIUM, *Rich. Br.*

Nephrodium, *Schott*, (§ *Eunephrodium* of this work).  
 HOOK. GEN. FIL. TAB. XLVIII. B. Sphærostephanos, *J. Sm.* (*Mesochlæna*, *Br.*) HOOK. GEN. FIL. TAB. XXIV.; *very inaccurate*. HOOK. FIL. EXOT. TAB. LXII; *very accurate*. Pleocnemia, *Pr.* HOOK. GEN. FIL. TAB. LXX. A. (*imperfect*) and TAB. XCVII. Lastrea, *Pr.* HOOK. GEN. FIL. TAB. XLV. A. Haplodictyum, *Pr.* Abacopteris, Plectochlæna, Camptodium, and Oochlamys, *Fée.* Pronephrium, *Pr.* Arthrobotrys, *Wall.* Arthropteris, *J. Sm.* Lastreas-trum, *Pr.* Hypodematium, *Kze.* Dichasium; *Braun.*

*Sori* dorsal, subglobose, involucre. *Involucre* cordate or reniform, fixed by the sinus on the back of free or combined veins, or terminal on a free veinlet. *Veins* either free or variously conjoined, and more or less anastomosing.—Ferns of *very varied form and character, seldom simple (undivided) or pinnatifid, very frequently pinnate, with the pinnæ pinnatifid, or compound and decompound. Caudex erect or creeping. Stipites and pinnules rarely articulated.* (*Fadyenia*, *Olean-*

dra, and *Neprolepis*, are here excluded from this genus, but more on account of habit and the general opinion in favour of their being kept apart, than from any decided technical characters.)

§ PLEOCNEMIA.—Primary opposite veins next to the costæ, one or more pairs, uniting and forming angular, costal, elongated areoles, the others more or less anastomosing, remote from the costa. Pleocnemia and *Haplodictyum*, Pr.

1. N. (Pleocnemia) *Leuzeanum*, Hook.; stipes  $1\frac{1}{2}$  foot long stout angular crinite at the base with very long subulate flexuose silky scales, fronds large ample submembranaceous tripinnate, primary pinnæ a foot and more long ovate acuminate petiolate, pinnules 3–4 inches long petiolulate from a broad subcordate base oblong deeply (more than halfway down) pinnatifid ending in a rather long entire acumen, fertile ones often contracted, segments oblong obtuse subfalcate entire crenato-serrate, the basal ones rarely sublobato-pinnatifid, veins uniting and forming elongated areoles near the costa, in the sterile more or less united and reticulated at a distance from the costa, sori copious more or less remote from the margins, involucre orbiculari-cordate readily deciduous.—*Aspidium Leuzeanum*, Kze. Bot. Zeit. 14. 474. Metten. Fil. Hort. Lips. p. 94. t. 22. f. 8, 9. Pleocnemia, Pr. Tent. Pterid. p. 183. Epimel. Plant. p. 50. Hook. Gen. Fil. t. 70 A. (involucre omitted) and t. 97. J. Sm. in Hook. Journ. Bot. iii. p. 411. Brack. Fil. U. S. Expl. Exp. p. 183. Polypodium, Gaud. in Freyc. Voy. p. 371. t. 6. Pleocnemia Cumingiana (fertile portions of the frond more contracted), Pr. Epimel. Bot. p. 50. *Aspidium conjugatum*, Bl. En. Fil. Jav. p. 169. Pleocnemia conj., Pr. Epimel. Bot. p. 259 and P. Javanica, p. 50.

Hab. Moluccas, Gaudichaud. Java, Blume, De Vriese and Teijsmann, n. 24, n. 107, and n. 114 (pinnules small, sori at the margin of the segments). Ceram, De Vriese and Teijsmann, n. 132. Luzon, Cuming, n. 33, 34, 107, 289. China, Beechey. Hongkong, Wilford, n. 152. Mishmee and Assam, Griffith, Simons. Sylhet, Wallich, Hook. fil. and Thomson. Samoan and Feejee Islands, Brackenridge, Harvey. Dr. Harvey's specimens from the Feejee Islands, in a dried state, are very dark-coloured, blackish-green above, paler beneath, with more deeply pinnatifid pinnules, and consequently longer segments and narrower in proportion. Brackenridge's Feejee Island specimens are in all probability the same.—This Fern must be a very noble one. Cuming speaks of it as a "Tree Fern;" Brackenridge says the trunk is short, thick, erect, surmounted by large, spreading, bipinnated fronds from 12–15 feet in length. In regard to the venation, many of the pinnæ, especially the fertile ones, have segments with entirely free venation, as in *Lastrea*, while others have an opposite lower pair of branches or veinlets united so as to form an oblong costal areole, as in *Eumephrodium*; while others have, in addition, one or more series of areoles near the margin, as in *Sagenia*.

2. N. (Pleocnemia) *aristatum*, Hook.; caudex creeping, stipites close-placed a span to 1 foot long, fronds of the same length as the stipites ovate submembranaceous pinnate, pinnæ 7-13 spreading all petiolate especially the large terminal one 4-6 inches long  $1-1\frac{1}{2}$  broad oblong-lanceolate falcate finely acuminate lobato-pinnatifid obliquely cuneate at the base rarely with two or three obovate auricles or distinct pinnules, their lobes triangular-ovate acute and as well as the apices of the pinnæ subaristato-serrate, primary veins (or costules of the lobes) pinnated with obliquely patent veinlets of which two or three pairs of the lower ones unite and form a very acute angle, sori dorsal on free or united veinlets, involucre reniform small ciliated sometimes elongated and curved at one end (as is frequent in *Athyrium*) with an elongated attachment. (TAB. CCXXXVIII.)—*Goniopteris aristata*, Fée, 8me Mém. Foug. p. 253. *Anisocampium Cumingianum*, Pr. Epimel. Bot. p. 58. *Cyclodium*, Moore. *Aspidium Otaria*, Kze. Herb. Metten. *Aspid.* p. 34.

Hab. Luzon, *Cuming*, n. 239. Ceylon, *Gardner*, n. 1299. Nilghiri, *Beddome*. E. Indies, *Wallich* (no locality recorded).—A very well marked Fern, but of doubtful genus. The venation may be considered as that of *Pleocnemia*; the involucre vary in shape. There is already a *Nephrodium Cumingianum*, which is the oldest specific name. I cannot adopt that of *Otaria* (bearing ears), for that is only characteristic of a form which, among my numerous specimens, is only found in *Cuming's* plant, the only one perhaps known to Kunze.

3. N. (Pleocnemia) *heterophyllum*, Hook.; caudex creeping, stipites crowded villous and partially scaly 2-3 inches long, fronds 5-6 inches long oblong-strapshaped shortly acuminate lobato-pinnatifid, at the very base imperfectly pinnate with dwarfed pinnæ, villous on the rachis and margins, lobes ovate obtuse; sterile ones with the veins irregularly anastomosing; fertile ones with one or two of the lowest pairs only united (as in *Eunephrodium*) the rest free, sori copious dorsal in two lines or series on each lobe between the costule and the margin, involucre?—*Aspidium* (*Nephrodium*) *heterophyllum*, Hook. Ic. Pl. t. 920. *Nephrodium* *Blumei*, J. Sm. in Hook. Journ. Bot. iii. p. 411 (name only) excl. the synonyms. *Aspidium*, Metten. *Aspid.* p. 98. t. 22. f. 5 (excl. var. 2, pinnate). *Haplodictyum heterophyllum*, Pr. Epimel. Bot. p. 51. Fée, Gen. Fil. p. 309. t. 18 C. f. 2.

Hab. Samaar, Philippine Islands, *Cuming*, n. 322.—Mr. J. Smith considered this Fern to be the same with the *Gymnogramme canescens*, Bot. Fil. Jav. t. 183, but I think hardly correctly so. Mettenius, however, holds the same opinion, and makes *Cuming's* n. 251 from *S. Ilocas*, a pinnated var. This however appears

quite distinct as far as I can judge from fronds with very imperfect fructification. It is *Lastrea exigua*, J. Sm. (name only), and *Physematum Philippinum* of Pr. Epimel. Bot. p. 34, according to his reference.

4. N. (Pleocnemia?) *excellens*, Bl.; "frond bipinnatifid membranaceous slightly pubescent on the veins and rachises on both sides, pinnæ sessile (a foot long) elongato-lanceolate sharply acuminate deeply pinnatifid, segments falcato-oblong acuminate entire or remotely crenulate, sori seriate, stipes glabrous."—*Bl. En. Fil. Jav.* p. 160. *Metten. Aspid.* p. 117. *Proferea, Pr. Epimel. Bot.* p. 259.

Hab. Java, *Blume*.—Although possessing an authentic specimen of this from Dr. Blume, I can add little more than the author has stated in the work above quoted, for the specimen is confined to two pinnæ only, nearly a foot long; these appear different from any other Fern known to me. The venation quite resembles that of *Pleocnemia*, and in my specimen the very small involucre are reniform; but Presl says, "oval, rarely orbicular, at the base often slightly emarginate, prolonged at the apex into an acute scariosse process." Blume alludes to its near affinity with his *Aspidium* (*Euaspidium*) *giganteum*, differing indeed, as he says, in the nature of the venation.

§ EUNEPHRODIUM.—*Costules or primary veins pinnate, secondary ones or veinlets, one (the lower one) or more pairs angularly connivent, and from those united ones producing an excurrent veinlet, which is free or extends to the angles above, thus forming, as it were, a pseudo-costule, which continues to the sinus.* *Nephrodium, Schott, Presl, and others.*

The union of one or more of the opposite veinlets is the characteristic of this group, or genus as many consider it. But there are cases, as is well known to the attentive student of Ferns, in which it is difficult to say if the union is complete; and in not a few cases there are free and united veinlets on the same individual specimen; hence many incorporate *Lastrea* with *Nephrodium* whether as a genus or a section, both having cordate or reniform involucre.

\* *Fronds simple, more or less pinnatifid, rarely pinnate at the base.*

5. N. (*Eunephrodium*) *Cumingianum*, J. Sm.; caudex creeping rooting, stipites crowded 3-6 inches long glossy stramineous slender, fronds thin membranaceous lanceolate acuminate costate the margin entire or sublobato-sinuate, costules pinnate with three to four erecto-patent veinlets mostly combined in opposite pairs, sori dorsal on the middle of a veinlet small, involucre small narrow-reniform membranaceous ciliated.—*Aspidium* (*Nephrodium*) *Cumingianum*, *Kze. in Schk. Fil. Suppl.* p. 17. t. 9. f. 2. *Metten. Aspid.* p. 96. *Nephrodium*, *J. Sm. in Bot. of Herald*, p. 237. t. 50 (not *Nephrodium Cumingii*, *J. Sm.*, which is *Nephrodium conio-neuron*, *Fée*).

Hab. Tropical America, Panama, *Cuming*, n. 1123, *Fendler*, n. 391. Isle of Coyba, *Seemann*.—A small, delicate, but well-marked species, accurately figured by Kunze, and in Dr. Seemann's 'Botany of H. M. S. Herald.'

6. N. (Eunephrodium) *Skinneri*, Hook.; caudex erect or ascending apparently proliferous clothed with the bases of former years' stipites, stipites terminal tufted 2-4 inches long with a few scattered scales, fronds submembranaceous firm lanceolate finely acuminate deeply (more than halfway down) pinnatifid, at the base pinnate, the apex entire, segments and pinnules oblong-ovate subfalcate rather acute entire, veins numerous lowest pair united, sori small dorsal between the costule and the margin, involucre reniform thin and membranaceous reticulated finely ciliated, rachis and veins beneath pubescenti-hirsute.—*Aspidium* (Nephrodium) *Skinneri*, *Hook. Cent. of Ferns*, t. 25.  *Ic. Plant.* t. 925. *Metten. Aspid.* p. 92.

Hab. Guatemala, *Skinner*. Bombinasa, Andes of Ecuador, *Spruce*.—Specimens of this, recently sent from the Andes of Ecuador, by Mr. Spruce, precisely correspond with those of Mr. Skinner. In the former country, it inhabits declivities which are occasionally flooded; and this circumstance perhaps explains the proliferous appearance of the caudex or rootstock.

7. N. (Eunephrodium) *Wrightii*, Hook.; caudex creeping branched paleaceous with dark-brown scales, stipites scattered 4-6 inches long rather stout stramineous dark-brown and scaly at the base, fronds 6-7 inches to 1 foot long coriaceous oblong-lanceolate short acuminate upper half or more deeply (beyond the middle) pinnatifid, segments numerous oblong obtuse  $\frac{1}{2}$  an inch to 1 inch long subfalcate entire, pinnæ oblong obtuse truncate at the base and often auricled above and sometimes also beneath, the auricles acute, veins prominent beneath whitish simple or forked, inferior pair combined, sori marginal, involucre small reniform or lunate subciliate, rachis and veins beneath pubescenti-hirsute. (TAB. CCXXXIX.)—*Aspidium* *Wrightii*, *Metten. MS. Eat. Fil. Wright. et Fendl.* p. 210.

Hab. Dense woods near Monte Verde, eastern Cuba, *C. Wright*, n. 824.—Eaton, who has well described this new species, notices its affinity with my *Nephrodium Skinneri*, from which, however, it is extremely different, in its creeping caudex, different form and texture of the fronds, the short acumen, and the marginal sori.

8. N. (Eunephrodium) *stenopteris*, Hook.; caudex short stout ascending, stipites tufted 2-4 inches long scaly below, fronds coriaceous 1-2 feet long elongato-lanceolate acuminate and often proliferous at the apex long-attenuated and decurrent upon the stipes at the base, more or less deeply pinnatifid most deeply above the middle with oblong-

ovate or short triangular and acute segments, at the very base are a few dwarfed detached lobes on the stipes, the long-attenuated lower part of the frond generally entire, several opposite pairs of veins unite as far as the sinus, involucre dark-coloured reniform ("orbicular and peltate black," *Kze.*).—*Aspidium stenopteris*, *Kze. in Schk. Fil. Suppl.* ii. p. 48. t. 120 (*excellent, if the involucre be correct*). *Polystichum*, *Moore. Polypodium scolopendrioides*, *Linn. Sp. Pl.* p. 1544 (*fide Mett.*). *P. incisum*, *Sw. Fil. Ind. Occ.* iii. p. 1840 (*fide Metten.*). *Syn. Fil.* p. 33. *Willd. Sp. Pl.* v. p. 182. *Goniopteris*, *Pr. Aspidium scolopendrioides*, *var. l. incisa*, *Metten. Aspid.* p. 97. *Eat. Fil. Wright et Fendl.* p. 211.

Hab. W. Indies: Cuba, *Linden, C. Wright, n.* 825; N. Grenada, *Purdie*.—*Kunze's* is an excellent representation of this plant, and I cannot agree with those who consider it a variety of *N. scolopendrioides*. My numerous specimens of the two exhibit no intermediate forms.

9. *N. (Eunephrodium) scolopendrioides*, *Hook.*; caudex short stout erect, stipites tufted 2–4 inches long deciduously scaly, fronds subcoriaceo-membranaceous a span to a foot and more long lanceolate acuminate tapering at the base glabrous deeply pinnatifid with ovate or oblong entire segments, at the base pinnate with a few small ovate-rotundate pinnæ, costules pinnated with simple or forked veins, the veins at the base united in opposite pairs, sori copious dorsal, involucre (reniform beset with trifurcate or stellated hairs on the back and margin, *Mett.*).—*Polypodium*, *Linn. Sp. Pl.* p. 1554. *Sw. Syn. Fil.* p. 33. *Willd. Sp. Pl.* v. p. 181. *Griseb. Pl. Carib.* p. 136. *Hook. Fil. Exot.* t. 18 (*not Hook. and Grev. Ic. Fil.* t. 42). *Goniopteris*, *Pr. Tent. Pterid.* p. 182. *Moore. Aspidium*, *Metten. Aspid.* p. 97 (*excl. var. incisa and pinnata*). *Goniopteris affinis*, *Fée, Gen. Fil.* p. 250. *Polypodium Domingense*, *Spr. and Kze. in Linnæa*, ix. p. 40. and xx. p. 300. *Filix non ramosa*, *scolopendrioides?* *Plum. Fil. Am.* p. 7. t. 11. *Filix Jamaicensis*, simpliciter pinnatis *Asplenii foliis*, etc., *Pluken. Almagest.* p. 152, and *Phytogr.* t. 290. f. 1 (*excellent*). *Plum. Fil. Am.* t. 91.

Hab. West Indies: St. Domingo, *Plumier*; Jamaica, *Plukenet, Purdie, Wilson*; Gaudeloupe, *Duchassaing*; Cuba, *Otto, Peppig*.—It is true our own specimens do not exhibit any trace of involucre; but *Mettenius* describes them, and there is no reason to question his accuracy. The species appears to be peculiar to the West Indian islands.

10. *N. (Eunephrodium) sclerophyllum*, *Pr.*; "frond oblong-sublinear subrigid pinnated above pinnatifid, the rachis beneath

and the stipes stellato-pubescent, pinnæ lanceolate obtuse grandi-dentate or pinnatifid, the lowest abbreviated and as well as the intermediate ones sessile, cordate and subauriculate at the base, superior ones adnate with the base decurrent, uppermost confluent, sori uniserial on the segments on the middle of the veins minute, involucre stellato-hirsute." *Aspidium*, Kze. in *Linnaea*, v. p. 92. *Nephrodium*, Pr. Tent. *Pterid.* p. 81. *Aspidium scolopendrioides*, var. 3, pinnata, Metten. *Aspid.* p. 97 (not Eat. in Fil. Wright et Fendl. p. 211).

Hab. Cuba, *Pæppig*.—I possess a solitary specimen of this *Nephrodium*, from Kunze, which well accords with his description. The two nos. 1005 and 1006 of Wright's Cuba Ferns, referred to this, seem to me rather to accord with some of the numerous forms of *Nephrodium molle*.

11. N. (*Eunephrodium*) *Jamesoni*, Hook.; caudex short erect copiously rooting, stipites tufted 4–6 inches long patently villous slightly and deciduously scaly, fronds 6–10 inches long 1–2 inches broad firm-membranaceous villous on both sides oblong-lanceolate gradually acuminate upper half or nearly so pinnatifid the rest pinnate, segments and pinnæ oblong-falcate obtuse coarsely and obtusely serrated (scarcely pinnatifid), the latter (pinnæ) shortly petiolate the base truncated subauricled above, lowest pair generally deflexed, base of the costa with a large brown gland beneath, veins pinnate flexuose, veinlets remote simple or once or twice forked, 2–3 inferior pairs united at very acute angles (subpleonemoid), sori in general copious in several series, involucre small hairy.

Hab. Ecuador, near the River Napo, *Jameson*, n. 761; Tarapota, Eastern Peru, *Spruce*, n. 3946.—Had I possessed only one or two specimens of this Fern, I might have been disposed to consider it an unusual state of *N. molle*; but I have half-a-dozen tufts from two widely-different localities, which are perfectly uniform. It may be possibly related to *Aspid. dissidens*, near to which I place it. This belongs as much to the next group of *Eunephrodium* as to the present.

\*\* *Fronds pinnate, sometimes pinnatifid at the apex, and sometimes bipinnate at the base.*

12. N. (*Eunephrodium*) *dissidens*, Metten.; "frond 8 inches long flaccido-membranaceous pubescenti-hirsute on both sides as well as the costa and stipes (5 inches long), with forked hairs oblong-lanceolate pinnate, pinnæ 2½ inches long 9 lines wide shortly petiolate from a cordate and broader base gradually attenuated pinnatifid, at the apex pinnatifido-serrated, segments ovato-oblong acute the basal superior ones largest crenato-pinnatifid, tertiary veins on each side eight or



nine, lowest ones forming costal arches, superior ones undivided free or forked, hence forming costular areoles, uppermost ones fertile, sori on each side the costule of the laciniae four to six in one series near the margin, indusium reniform very small fringed with undivided or forked hairs longer than the indusium."—*Aspidium dissidens*, Metten. *Aspid.* p. 116. *Polypodium oligocarpum*, *Herb. Spreng.*

Hab. Portorico (*Metten.*).—This is quite unknown to me. Mettenius groups it with the *Pleoenemia*-section, but he does not allude to its affinities.

13. N. (*Eunephrodium*) *Javanicum*, Hook.; caudex short stout erect paleaceous, as are the short robust tufted stipites, with finely acuminate deciduous scales, fronds 2 feet and more long villous especially on the veins and rachides beneath subcoriaceous ovato-oblong long caudato-acuminate much attenuated below, pinnate, pinnæ numerous approximate spreading 4–5 inches long  $\frac{1}{3}$  of an inch wide from a broad truncated sessile base gradually tapering into a fine acuminate entire point pinnatifid, scarcely auricled at the base, many of the lowest ones contracted small subtriangular and these extend almost to the base of the stipes, lobes oblong-ovate obtuse ciliated the margin entire sometimes recurved, veinlets numerous approximate two or three lowest pairs united all soriferous near the middle, involucre subhippocrepiform hairy on the back fringed with glandular hairs and attached beyond the middle to an elongated receptacle.—*Hook. Fil. Exot. tab.* 61. *Mesochlæna Javanica*, *Br. Mss. Metten. Fil. Hort. Lips.* p. 96. t. 18. f. 13 (excellent). *Aspid.* p. 103. *M. asplenoides*, *J. Sm. in Gen. of Ferns*, p. 71. *Sphærostephanos*, *J. Sm. in Hook. Gen. Fil.* t. 24 (the analysis by Bauer very faulty). *Polypodium caudigerum*, *Wall. Cat. n.* 298. *Stegogramme Mesochlæna*, *Fée, Gen. Fil.* p. 204. *Aspidium polycarpum*, *Bl. En. Fil. Jav.* p. 156.

Hab. Malay Islands: Java, *Blume, De Vriese and Teijsmann, Millett, Thos. Lobb*; Singapore and Penang, *Wallich, G. Porter, Sir Wm. Norris*; Island of Nusa Kambangan, *Blume*; Moluccas (*Brown in Herb. Carmichael*).—A Fern of the Malay Islands, whose fructification had, till lately, been greatly misunderstood. It is a true *Nephrodium*, with the receptacle of the involucre more elongated than usual, hence giving it a horseshoe-like form, as is not unfrequent in *Euaspidium*, and showing no small affinity with that of *Didymochlæna*. (See more full description in 'Filices Exoticae,' l. c.)

14. N. (*Eunephrodium*) *molle*, Desv.; caudex stout horizontal short densely rooting, stipites a span to a foot and more long, fronds rather soft-membranaceous 1–2 feet long

more or less pubescent oblong-lanceolate abrupt at the base (or sometimes much attenuated there with distant dwarfed pinnæ) pinnated pinnatifid at the apex, pinnæ numerous horizontal sessile oblong and generally broadest at the base or lanceolate more or less acuminate 3-5 inches long pinnatifid more or less deeply, the segments semiovate obtuse or oblong a little falcate, lowest pair of veinlets uniting and sending out a veinlet which is prolonged to the sinus of the segments, the rest free simple rarely forked, sori in two rows situated near middle of the free veinlets or at the junction of the two basal ones, involucre cordato-reniform more or less villous.—*Schott, Gen. Fil. cum. Ic. Desv. Mem. Soc. Linn.* vi. p. 258. *Br. Brodr. Nov. Holl.* p. 149. *Aspidium, Sw. Syn. Fil.* p. 49. *Willd. Sp. Pl.* v. p. 246. *Metten. Aspid.* 103. *Polypodium, Jacq. Ic. Pl. Rar. t.* 640. *Polystichum, Gaud. Aspid. nymphale, Forst. Prodr.* p. 81, and *Schk. Fil.* p. 36. t. 34 (*Metten.*). *Aspid. appendiculatum, Wall. Cat. (in part).* *Aspid. canescens, Wall. Cat. n.* 354 (*in part*). *Aspid. parasiticum, Sieb. and Sw. Syn.* p. 49 (*Metten.*). *Bl. En. Fil.* p. 159. *Polypod., Linn. (Metten.) Mettenius adds to these Polypod. latebrosum, Wall., Nephrod. Helsinbergii, Pr., Polyp. diversifrons, Kl. and Kze., and Aspid. patens, Lk.*

Hab. In tropical and subtropical countries; the most cosmopolitan, perhaps, of all Ferns.

1. AFRICA and adjacent islands: Algeria, *Boné*; Madeira and all the West-African tropical and extratropical islands, abundant; Sierra Leone, Niger, *Forbes, Vogel, Brunner, Barter, Mann*; South Africa, Cape Town to Macalisberg in the interior, Natal, East Coast, Zambesi, *Dr. Kirk*; Abyssinia, *Schimper*; Bourbon, "*Aspid. pulchrum, Bory,*" *Carmichael*; Mauritius, *Sieber, n.* 49; *Asp. Helsinbergii, Bojer, etc.*

2. CEYLON, *Thwaites, Gardner, Genl. Walker.*

3. INDIAN CONTINENT, most abundant from the West to the extreme East, and from the South to the Himalayas, *Wallich, including his A. canescens, Cat. n.* 354, *A. canum, n.* 387, a large var. with small tubercles bearing subulate paleaceous scales; Nepal, *Hooker fil. et Thomson, n.* 240 a. *Polypod. mollusculum, Wall. Cat. n.* 332, a common form, with deeper and narrower segments. *Polypod. appendiculatum, Wall. Cat. n.* 349, almost identical with the latter. *Polypod. nemorale, Wall. Cat. n.* 1317. *Aspid. parasiticum, Wall. Cat. n.* 2239; many of the larger states from the Indian continent are sometimes quite glabrous.

4. MALAY ISLANDS AND PENINSULA, probably universal: Rangoon, *Aspid. solum, Wall. Cat. n.* 350; Moulmein, *Parish*, terminal pinna very long; Luzon, *n.* 83, and *n.* 279, and 51, and 102. (*N. diversilobum, Pr. Epim. Bot. p.* 47, *Metten. Aspid. p.* 100. *N. mucronatum, J. Sm., in part. N. Smithianum, Pr. Epimel. Bot.*, small, with the basal lobe of the pinnæ on each side forming an auricle: another *Nephrodium* of *J. Sm.* under one of these numbers is *A. angustifolium* of *Pr. Epimel. p.* 58, probably a distinct species; the *N. Smithianum* I possess also from Amboyna.) *Aspid. tectum, Wall. Cat. n.* 394. Singapore, Java, *Blume*, his *Aspid. subpubescens, En. Fil. Jav. p.* 149, and *Asp. heterocarpum, Bl. En. Fil. Jav. p.* 155, *De Vriese and Teijsmann, n.* 265, 284, and *A. parasiticum, Bl. En.*

*Fil. Jav. p. 149, and Gymnogramme appendiculata, Fil. Jav. p. 92. t. 39, Metten. Phoept. p. 22; Moulmein, Parish; Borneo, Motley, Barber, Thos. Lobb.*

5. CHINA, *Beechey*: Hongkong, abundant, Formosa, *Wilford*, terminal pinna very long; Kinsin, Japan, *C. Wright, Babington, Miss Nelson.* (N. *sophoroides, Desv.*) Bonin, *Mertens, and Loochoo, C. Wright.*

6. PACIFIC ISLANDS: Feejee, *Harvey, Seemann, Milne; Aneiteum, Sunday Island, Tanna, etc., Milne; Pitcairn's Island, Cuming, n. 1370; Oahu and Coral Islands, Beechey (Aspid. nymphale, Schk., and Hook. and Arn. Bot. of Beech. Voy.); Norfolk Island, all voyagers.*

7. AUSTRALIA, *R. Brown, Capt. Sturt; Moreton Bay, Mueller; Teviot River, Fraser; Brown's River, Macgillivray; Sydney, Bynoe.*

8. SOUTH AMERICA. West Indian Islands, probably universal: Jamaica, Cuba, *C. Wright, n. 1005 and 1006; those which Mr. Eaton refers to A. scolopendrioides, var. pinnata (A. sclerophyllum, Kze.) I rather consider a form of N. molle. From the continent of the new world, I possess specimens from New Mexico, C. Wright; Mexico proper, Linden, n. 1505; from various parts of Central America; Ecuador, Esmeraldas, Jameson, Col. Hall, Spruce (no number); Peru, Cuming, n. 1080; Tarapota, Eastern Peru, Spruce, 4039 (narrow pinnae and narrow segments), and 4749, "4660 affin." (broad pinnae, 1 inch broad, and broad segments), and 4949, and 4659; Brazil, frequent, Gardner, n. 1107 and 1902, Sellow; Cayenne, Leprieur, and others; New Granada, Venezuela, Feudler, n. 176 and 190 (A. patens, Eat.), Steetz, n. 114, Schlim, n. 497.*

9. IN NORTH AMERICA, I do not find *N. molle* anywhere recorded as a native, save by Kunze, in Silliman's Journal, as inhabiting the Southern U. States; but this proved to be *A. (Lastrea) patens, Sw.*, as stated in Chapm. Fl. of S. U. States, p. 594, and at Sitka, *Mertens, in Russian America, between lat 56° and 58° N.; but this latter surely needs confirmation.*

It was only to be anticipated that with a plant having so widely extended a geographical range, there should be considerable variations under the different influences of soil, climate, etc., and this has led to the formation of many supposed species; some of these states, it must be confessed, border closely on several others, both of this and of the *Lastrea*-group, and it needs a very experienced eye to distinguish them, and an able hand clearly to define them. Jacquin's figure well represents the type of the species. Some fronds are truncated and abrupt as it were at the base, others have the base contracted and the pinnae there dwarfed and distant. The texture is usually membranaceous, but others are subcoriaceous. The pinnae vary much in number, and in being hairy or glabrous, in the length and breadth, and in the depth of the sinuses between the segments; the latter are sometimes short and as broad as long, sometimes narrow-oblong. The sori are sometimes sparse, at other times densely crowded and almost confluent.

15. N. (*Eunephrodium*) *angustifolium, Pr.; "frond oblong-lanceolate" (a span to 1½ foot long subcoriaceous-membranaceous) "pinnated, pinnae (2-5 inches long ¼ of an inch broad) sessile narrow linear shortly caudato-acuminate pinnatifid obtuse at the base lowest ones minute subovate, veins soriferous in the middle the lowest pair anastomosing, indusium ciliate and hairy" (caudex in one of my specimens, a young plant, short erect sending down copious wiry roots). —Nephrodium angustifolium, Pr. Epimel. Bot. p. 48. N. mucronatum, J. Sm. in Hook. Journ. Bot. iii. p. 412, in part. Metten. Aspid. p. 106.*

Hab. Luzon, *Cuming*, n. 263, in part.—I retain this as a species with great hesitation, and mainly because my only specimen with any root to it shows a short erect caudex; but as this is on a young though fertile plant, it may not be in a perfect state. If the perfect state should prove to be a creeping root, then I do not see how it is to be distinguished from *Asp. molle*. I have already observed that that species has not unfrequently several of the lower pinnæ dwarfed and minute.

16. N. (*Eunephrodium*) *stipellatum*, Hook.; "frond bipinnatifid subcoriaceous pubescent on each side the rachis and on the veins beneath, pinnæ (fertile ones narrower) sessile (furnished beneath at the union with the rachis with a palea) linear-lanceolate acuminate truncate at the base pinnatifid, the segments subfalcato-oblong obtuse entire united by a pellucid thin membrane, lowest one above a little longer than the rest, sori biseriate approximate, involucre glabrous, stipes glabrous channelled above."—*Aspid. Bl. En. Fil. Jav. p. 152.*

Hab. Java, *Blume*.—Possessing, as I do, from the author only a fragment with four sterile pinnales of this Fern, I can throw no new light on this Fern. Dr. Blume gives its affinity as with *Asp. sophoroides* (A. molle, Sw.), with which indeed the sterile pinnæ and the venation quite agree; there are, however, present at the base of each pinna beneath, not what I should call a "palea," but a subulate fleshy gland, quite unlike that of *N. hirsutum*, our next species.

17. N. (*Nephrodium*) *hirsutum*, J. Sm.; stipes and principal portion of the rachis villous with long soft close-pressed hairs, fronds 3-4 feet long ovato-lanceolate acuminate membranaceous  $1\frac{1}{2}$  foot and more wide pinnated slightly hairy on the costæ above glabrous and minutely glanduloso-resiniferous beneath, pinnæ very numerous approximate sessile 10 inches long in the broadest part of the frond and nearly an inch wide linear-oblong finely acuminate truncated at the base uniformly pinnatifid about halfway down to the costa, at the base beneath on the rachis is a large conspicuous disciform scale or gland chiefly present on the lower half of the frond, segments ovato-oblong subfalcate entire rather obtuse, one or two of the lowest pairs of veinlets combined, sori most copious on the upper half of the frond near the middle of all the veinlets, involucre glabrous. (TAB. CCXL. B.)—*J. Sm. in Hook. Journ. Bot. iii. p. 412 (name only). Pr. Epimel. Bot. p. 48. Aspid., Metten. Aspid. p. 107.*

Hab. Luzon, *Cuming*, n. 82. Assam, *Simons*, n. 279?—First described by Presl, who entirely overlooked the remarkable glandular disc at the base of the pinnæ, but says "affine *Nephr. appendiculato*, *N. molli*, et *N. nymphali*" (all one species with us). The upper half of the frond, where this gland is wanting, can indeed scarcely be distinguished from *N. molle*; but, taking into consideration the great size of the frond, the presence of this large gland on the inferior half of the rachis, and the minute resinous glandular dots beneath, it may safely rank as a

species. The specific name is hardly applicable to the Assam plant. I possess only the upper part of a frond, whereon there are no glands to enable me to verify the species.

18. *N. (Eunephrodium) venustum*, J. Sm.; "fronds glabrous lanceolate" (pinnate, the pinnæ pinnatifid), "pinnæ lanceolate truncate at the base subsessile alternate, segments falcate, sori minute marginal."—*Hew. in Ferns of Jamaica*, p. 112 (*Aspid.*). *J. Sm. Cat. Gard. Ferns*, p. 54.

Hab. Mayday Mountains, Jamaica, *R. Howard*.—I fear this may prove only a var. of *N. molle*, with larger and broader pinnæ, and the sori more marginal than usual.

19. *N. (Eunephrodium) crinipes*, Hook.; stipes nearly 1 foot long and as well as the rachis stout and singularly erect and stiff stramineous the former shaggy with copious long spreading flexuose subulate dark brown scales which extend some way up the rachis, frond more than 2 feet long submembranaceous quite glabrous from a broad base oblong acuminate copiously pinnated, pinnæ 5–6 inches long less than  $\frac{1}{2}$  an inch broad sessile horizontally patent from a broad base linear-oblong finely acuminate pinnatifid more than halfway down to the rachis with oblong subfalcate obtuse entire segments, lowest segments a little longer than the rest, lowest pair of veinlets united, sori on all the veinlets and on nearly every pinna large cordato-reniform very membranaceous.

Hab. Sikkim Himalaya, alt. 1000 feet, *Hook. fil. and Thomson*.—This Fern, of which we possess only a solitary specimen, has the shaggy crinite scales of the stipes and rachis of *Aspidium* (§ *Lastrea*) *patentissimum* of Wallich (but the stipes is much longer), the pinnæ of *N. (Lastr.) patens*, and the venation of *N. molle*. The stipes and rachis are remarkably stiff and straight, and the pinnæ of a pale yellowish-green, horizontally patent.

20. *N. (Eunephrodium) venulosum*,\* Hook.; quite glabrous, stipes  $1\frac{1}{2}$  foot and more long stout and together with the rachis sharply angled brownish-green, frond  $4\frac{1}{2}$  feet long broad ovato-lanceolate acuminate subcoriaceous-membranaceous dark green glabrous copiously pinnated, pinnæ 6–9 inches long 1 inch broad mostly opposite sessile oblong gradually and very finely acuminate deeply more than halfway down pinnatifid with oblong subfalcate subcrenate segments serrated at their apex superior ones approximate inferior pairs distant 2 inches apart somewhat contracted at the base, lowest four or five pairs suddenly and very much dwarfed 4 inches apart auricled at the base above conspicuously veined, costules

\* Not *Aspidium venulosum*, Wall., which is *Nephrad. multilineatum*.

above pale almost silvery, one or two of the lowest pairs of veinlets united, sori very copious on nearly all the veinlets and on nearly all the pinnæ in two rows from the rachis to the apex, involucre very small convex firm reniformi-cordate soon obliterated by the copious capsules.

Hab. Fernando Po, *G. Mann*.—It is with much hesitation I make of this a new species; and yet I cannot satisfactorily refer it to any described one. Its venation closely resembles that of *N. molle*, but the primary veins are conspicuous on the upper side; and it may be a gigantic and very copiously pinnated state of that plant, glabrous in every part. The involucre are small, but distinctly present, or I might have considered it a form of the very little understood *Polypodium* (*Goniopteris*) *tetragonum*. The specimen is a remarkably fine one 6 feet long, including the stipes, wanting only the caudex.

21. *N. (Nephrodium) extensum*, Bl.; caudex long creeping black (in African specimens), stipes 1-1½ foot long slightly scaly at the base, fronds 1½-2-3 feet and more long 1-1½ foot broad oblong-lanceolate acuminate submembranaceous copiously pinnate pinnatifid at the apex, pinnæ numerous approximate subhorizontal 8-12 inches long in the broadest part ½-¾ of an inch wide from a broad sessile base linear-oblong finely acuminate glabrous pinnatifid about halfway down to the rachis, the acumen entire, segments narrow-ovate or oblong or oblong-linear subfalcate entire subacute, lowest pairs of veinlets angularly uniting the rest free, sori copious but solitary on the veinlets between the costule and the margin often strictly confined to the segments (as in Dr. Blume's original specimen in my herbarium) at other times extending to the lowest veinlets so that the disk is soriferous, involucre small orbiculari-cordate glabrous often appearing quite orbicular and peltate. (TAB. CCXL. A.)—*Aspidium*, Bl. *En. Fil. Jav.* p. 156. *A. multijugum*, Wall. *Cat. n.* 348. *N. caudiculatum*, Sieb. *Syn. Fil. n.* 47. *Nephrod. Pr. Epimel. Bot.* p. 46. *J. Sm. in Hook. Journ. Bot.* p. 411 (*perhaps only in part*). *N. Hudsonianum*, Brack. *Fil. U. S. Expl. Exp.* p. 189. *t.* 25.

Hab. India: Penang, Blume, Wallich, *n.* 348, Sir Wm. Norris, *Lady Dalhousie*. Java, Thos. Lobb. Luzon, *n.* 10, 84, Leyte, *n.* 317, Zebu, *n.* 338, *Cuming*, if I am correct in referring the *N. caudiculatum* of *J. Smith* here. Ternate, *De Vriese and Teijsmann*, *n.* 314 (the lowest pinna dwarfed). Cupang, Timor, *Al. Cunningham*. Singapore, *Seemann*. Moulmein, *Parish*, *n.* 101? (sterile, rachis with subulate scales), Thos. Lobb. Assam and Khasya, *Griffith*, *Simons*, *Hook. fil. and Thomson*, *n.* 242, and Sikkim. Cochin, *Johnstone*. Nighiri, *Wight*, *n.* 117, *Beddome*, *n.* 140, *G. Thomson*. Ceylon, *Genl. Walker*. Pejee Islands?, *Seemann*, sterile. Sandwich Islands, *Brackenridge*. Tropical West Africa: Mitshe, *Barter in Baikie's Niger Exped. n.* 571 and (Napo) 1444; Quorra, *Vogel*, *n.* 185 and 61. Fernando Po, *Vogel*, *n.* 106.—I possess this handsome species

from two authentic sources: 1. copious and fine specimens from Dr. Wallich, by whom it has been largely distributed with the name of *Aspid. multijugum*; and 2. two pinnæ from Dr. Blume, as his published species, *Aspid. extensum*, and to this latter name I am bound to give the preference. Fine a plant as it is, it is difficult, save in its larger and more luxuriant growth, the elongated and narrower pinnæ and segments, to distinguish it from *Asp. molle*. The venation is the same, and I fear many intermediate forms exist. Some, and indeed many, specimens have the sori quite confined to the segments, and then a good deal resembling *Aspid. terminans*, Wall., with all the disk free from sori; at other times the sori extend below the segments; and in not a few samples the very lowest veinlets (the united ones) are soriferous, so that the whole disk is fructiferous. In general, the more copious the fructifications the more contracted the pinnæ and segments. —Many will perhaps be surprised that I have introduced the *Nephrod. caudiculatum* of Presl, and J. Sm., and Mettenius, but I really have no choice; I must either place it here, or with *Asp. molle*. The original authority for this is a large Fern from the Mauritius, *Sieber, Syn. Fil. n. 47*, which is a dilated and flaccid form of the present species, and precisely agrees with Blume's *Asp. heterocarpum*, which I have placed under *A. molle*, and which I believe to be a safe place for it. My authority for the other specimens of *caudiculatum* is Mr. J. Smith, than whom few botanists have a keener eye for distinguishing species among Ferns. I possess specimens he has brought under that name from Cuming's Philippine Island plants, of these n. 10 and one of the number 338 are what I consider typical of *A. extensum*; another, n. 338, and n. 84, has a more or less acuminate base to the pinnæ and lobes; my specimens are neither of them fertile. My n. 317 and one numbered 83 (Luzon, Cuming), not noticed by Smith, have a very different *primâ facie* appearance (but they are evidently young though fertile), and they have the base of the pinnæ subhastate, with a rather acute auricle above and a short rounded lobe below, and the lobes at the margin short, rather coarsely serrated than lobed. I suspect the truth to be that these, and not a few others bearing different specific names, would be best united with *A. molle*. Brackenridge's *Nephrod. Hudsonianum* may, I think, be safely referred here.

22. N. (Eunephrodium) *terminans*, J. Sm.; caudex creeping scaly, stipes 1–2 feet long a little scaly at the base, frond about the same length submembranaceous oblong or ovato-oblong acuminate pinnated, terminal pinna generally free but often deeply pinnatifid, lateral pinnæ 4–6–8 inches long patent scarcely petiolate from a broad (or sometimes contracted) base linear-oblong finely acuminate pinnatifid about halfway down towards the costa with numerous subovate rather acute slightly falcate segments, lowest pair of veinlets united below the sinuses, sori confined to the segments and often to the apex of the segments rarely extending below the sinuses, involucre orbicular reniform. — *Aspidium terminans*, Wall. *Cat. n. 386. Kze. in Linnæa*, xxiii. p. 230. *Nephrodium Cumingii*, J. Sm. in Hook. *Journ. Bot.* iii. p. 411. N. conioneuron, Fée, *Gen. Fil. p. 308. Metten. Aspid. p. 102. Lastrea Malaccensis, Pr. Epim. Bot. p. 35 (fide Metten.)*. *Aspid. Schwenkii*, β, Bl. in *Herb. Hook. Aspid. unitum*, Hook. et Arn. *Bot. of Beech. Voy.*



Hab. East India: Kamoun, *Wallich*, n. 386 and 1362; Nilghiri, *G. Thomson* (young involucre often quite orbicular and peltate), *Beddome*, n. 137; Ceylon, *Gardner*, n. 1106; Moulmein, *C. S. P. Parish*, n. 52; Malacca, *Cuming*, n. 391, and Luzon, 293 and 48, *Griffith*; Java, *Blume*, *De Vriese*, n. 214, *Thos. Lobb*, *Zollinger*, n. 118; Singapore, *Thos. Lobb*. China, *Beechey*.—Authentic specimens in my herbarium, justify me, I think, in bringing most of the above synonyms and localities under the *Aspid. terminans* of Wallich, and certainly these specimens have a peculiar aspect, mainly arising from the sori being apicular, if I may so say, confined to the rather short lobes of the pinnæ, and often not extending so far down as to the sinus, but leaving a broad longitudinal disk, with the costa in the centre, quite free from sori. But, again, I have specimens with sori approaching the costa, and then the difficulty is to distinguish it from some forms of what I have here called *N. unitum*.

23. *N. (Eunephrodium) Arbuscula*, Desv.; caudex creeping, stipites approximate a span to a foot or more long, fronds firm-membranaceous scarcely subcoriaceous pubescent 1–2 feet long a span broad oblong-lanceolate acuminate a good deal yet abruptly attenuated at the base, pinnated, pinnæ approximate subpetiolate from a dilated base frequently auricled above and rotundate below narrow-oblong gradually and finely acuminate coarsely crenato-serrate, lower ones (several pairs) dwarfed remote subdeltoid and subtrilobed, three or four pairs of the veinlets anastomosing, a few free veinlets only in the teeth, sori solitary near the middle of each veinlet except on the teeth, indusium small rotundato-reniform.—*Aspidium*, *Willd. Sp. Pl.* v. p. 233. *Metten. Aspid.* p. 106. *Nephrodium*, *Desv. Mém. Soc. Linn.* vi. p. 253. *Aspid. Hookeri*, *Wall. Cat.* n. 338, at p. 64. *Hook. Ic. Plant.* t. 922. *A. puberum*, *Wall. Cat.* n. 338.

Hab. Mauritius, *Sieber, Syn. Fil.* n. 45, *Fl. Mixta*, n. 289, *Bojer*. Ceylon, *Mrs. Genl. Walker, Gardner*, n. 1109. India: Dindigul, elev. 4000 feet, *Dr. Wight*; Nepal and Pundua, *Wallich, Falconer* (dwarfed pinnæ triangular-acuminate).—A recent attentive study of the *Nephrod. Arbuscula*, has satisfied me that *Dr. Wallich's Aspid. Hookeri* (figured in the 'Icones Plantarum') does not differ from it; and striking as are the dwarfed lower pinnules upon our specimens, we know that in *N. molle*, and other *Aspidiaceae* species, they are not always constant.

24. *N. (Eunephrodium) lineatum*, Pr.; "rhizome ascending, fronds dimorphous, sterile stipites 4–5 inches long hairy above, fronds rigid, 6½ inches to 1 foot long pubescent at length nearly glabrous ovate or lanceolate pinnated, pinnæ five to eight pairs sessile 1–4 inches long  $\frac{1}{8}$  of an inch wide from a truncated base generally auricled above oblong entire or serrated repando-serrate towards the apex which is rather obtuse or shortly cuspidato-acuminate confluent into a pinnatifid apex, or the lateral pinnæ are 4 lines long

abbreviated and the terminal pinna very large elongated coarsely crenate or entire, of the *fertile* plant the stipes is 8–10 inches long, the pinnæ narrower acuminate, five to eight of the veinlets united in pairs, sori approximate at length confluent, involucre reniform persistent corrugated on the back and margin shortly setose or glandulose." *Mett.*—*Aspidium lineatum*, *Bl. En. Fil. Jav.* p. 144 (*not Wall.*). *Metten. Aspid.* p. 110. *Nephrodium*, *Pr. Epimel. Bot.* p. 48. *Nephrod. acrostichoides*, *J. Sm. in Hook. Journ. Bot.* iii. p. 111. *Cyclodium*, *J. Sm. l. c.* p. 199. *Pronephrium*, *Pr. Epimel.* p. 259. *Gymnogramme macrotis*, *Kze. Aspid. affine*, *Bl. En. Fil. Jav.* p. 118. *Pronephrium*, *Pr. Epimel. Bot.* p. 259. *Nephrodium auriculare*, *Pr. Epim. l. c.* p. 258. *A. obscurum?*, *Bl. En. Fil.* p. 150. *Metten. Aspid.* p. 109, fronds 2 feet long, and pinnæ large in proportion.

Hab. Java, *Blume*. Bantam, *Blume* (*A. affine*, in *Herb. Nostr. from Blume*). Luzon, *Cuming*, n. 149 (*Nephrod. acrostichoides*, *J. Sm.*). Ceram, *De Vriese and Teijsmann*, n. 589. Indian Archipelago, *Seemann*, n. 2297 (exactly corresponding with *Blume's A. affine*). Bootan, *Griffith* (corresponding with *J. Smith's Nephrod. acrostich.*). Amboyna (*ex Herb. Webb*), fertile fronds quite those of *Cuming's* n. 149. Large form? Java, *Blume*, *Asp. obscurum*, *Bl.?*—Possessing, as I do, authentic specimens of most of the synonyms brought by *Mettenius* under this species (and they are by no means few), I yet feel utterly incompetent to define it, there are so many trifling variations in the different specimens, so that I prefer giving *Mettenius's* character of the species. I am most doubtful of the *A. obscurum* of *Bl.*, which I have referred hither; but, except in size, I do not see how it differs. It has the abbreviated lower pinnæ very decided.

25. N. (*Eunephrodium*) *Amboinens*, *Pr.*; "stipes 1–3 inches long slightly pilose above, fronds membranaceous nearly glabrous sprinkled beneath with minute sessile glands 6 inches long lanceolate acuminate pinnated, pinnæ five pairs, 1½ inch long 4 lines wide subsessile from a subcuneate base below truncate above oblong acuminate pinnatifidly crenate entire at the apex, the superior ones confluent into a terminal elongated and attenuated pinna pinnatifid at the base, veinlets three or four pairs uniting, sori in the middle of two or three of the costules, involucre reniform membranaceous tender shortly setose at the margin." *Metten.*—*Aspid. Amboinense*, *Willd. Sp. Pl.* v. p. 228. *Bl. En. Fil. Jav.* p. 148. *Metten. Aspid.* p. 105. *Nephrodium*, *Pr.*

Hab. Java and the Moluccas, *Blume*, in *Herb. Nostr.*, *Millett*, *Zollinger*, n. 1601 (*Metten.*).—*Mettenius's* character here given, sufficiently accords with my Java specimen from *Blume*, and from *Mr. Millett*; yet these have not the ap-

pearance of having arrived at full maturity. I could fancy it possible they might be young yet fertile states of *N. lineatum*, or even of very young *N. Arbuscula*.

26. *N. (Eunephrodium) glandulosum*, J. Sm. (*not Hook. et Arn.*); stipites a foot and more long, fronds firm-membranaceous 1-1½ foot long asperous on the surface with minute raised points (scarcely glandulose) and slightly villous on the veins beneath ovate-oblong subdimorphous pinnated, pinnæ 5-18, those of the *sterile* frond 3-6 inches long and 1-2 inches wide from a broad truncated sessile or petiolated base elliptical-oblong shortly and suddenly acuminate subentire or more or less coarsely lobato-serrate at the margin, the apices entire, *fertile* fronds with pinnæ smaller 2-3½ inches long from an obtuse or truncated base sometimes with a small auricle above oblong gradually but obtusely acuminate entire or crenato-serrate at the margin, veinlets numerous (10-12 pairs) which are all united in the large sterile pinnæ, four or five pairs in the fertile ones all soriferous in the middle, involucre small cordato-reniform.—*Aspidium*, *Bl. En. Fil. Jav. p.* 144. *Metten. Aspid. p.* 111. *Nephrodium*, *J. Sm. in Hook. Journ. Bot. p.* 411. *N. latifolium*, *Pr. Epim. Bot. p.* 45. *Cyclodium*, *Pr. Tent. Pterid. p.* 85. *Abacopteris Philipinarum*, *Fée, Gen. Fil. p.* 310. *t.* 18. *c. G. f.* 1.

Hab. Java, *Blume, in Herb. Nostr.* Island of Leyte, *Cuming, n.* 298. Assam, *Griffith*.—A well-marked and handsome species, more or less dimorphous; one of my specimens however has large and sterile pinnæ on one half the frond, and smaller and fertile ones on the other.—From Madagascar I have a fragment of a frond of a *Nephrodium* allied to this, but unquestionably distinct, yet too imperfect for description; the portion includes the base, and is 16 inches long, with eight very distinct pairs of opposite, horizontal, petiolated pinnæ, 4½ inches long, oblong-lanceolate, crenato-sinuate, perfectly glabrous and smooth on both sides: venation as in *N. glandulosum*, but the veinlets are more distant; the sori are larger and of a very dark brown colour. The pinnæ are 2 and 2½ inches apart. The species may be called *N. distans*, Hook.

27. *N. (Eunephrodium) cyatheoides*, Kaulf.; caudex? stipes a span and probably much more long stout castaneous glossy, fronds 1½ foot and more long subcoriaceo-membranaceous dark blackish-green when dry glabrous in age 1½-2 feet and more long and more than a foot wide pinnated to the very apex, pinnæ numerous approximate petiolate 6-8-10 inches long ¾-1 inch broad from a truncated base elongato-oblong finely acuminate often falcate subentire or pinnatifid dentate at the margin, teeth or segments various in length and very irregular acute sometimes giving a ragged or lacinated appearance to the margin, costules slender horizontal ter-

minating at the apex of the teeth-like segments, veinlets six seven or eight pairs uniting and sending out a flexuose vein which terminates at the sinuses of the teeth, sori small on each veinlet in two lines close to the costules forming transverse bands of brown dotted lines, involucres cordato-reniform. (TAB. CCXLI. A.)—*Klfs. En. Fil. p. 934. Metten. Aspid. p. 110. Nephrodium, Pr. Tent. Pterid. p. 81. Brack. Fil. U. S. Expl. Exp. p. 189. Polystichum Debreuillianum, Gaud. in Freyc. Voy. Bot. Crypt. p. 333. t. 9. Nephrodium, Hook. et Arn. Bot. of Beech. Voy. p. 105. Pr. Tent. Pterid. p. 81.*

Hab. Sandwich Islands, *Chamisso. Oahu, Beechey, Seemann, n. 1697, Captain Haynes, Douglas, n. 42, Dr. Diell, n. 23. Sumatra, Tuschemacher, in Herb. Nostr.*—This is a striking Fern, with large pinnæ spreading almost horizontally, and these have a remarkably banded appearance from the transverse lines of brown sori, which though arranged in two lines one on each side of, but close to the costule, yet in age unite as it were into one, and extend almost from one margin to the opposite, but rarely are the small teeth or segments soriferous.

28. N. (*Eunephrodium*) *ferox*, Moore; stipites robust 2 and more feet long crinite with coarse long subulate blackish scales which more or less extend to the rachides each bristle-like hair seated on a tubercle, fronds ample probably several feet long very rigid and coriaceous glossy 2–3 feet broad (judging by the length of the pinnæ) glabrous pinnated, pinnæ numerous sessile approximate 1–1½ foot long often an inch broad sessile from a truncated base elongato-oblong falcate finely acuminate regularly (about one-third of the way down from the margin) pinnatifid with ovate acute pungent falcate segments, costa and costules prominent beneath, veinlets close placed elevated six to eight pairs united and excurrent forming a pseudo-costule as distinct as the costule from which they spring and which terminates at the sinus, sori in two rows close to the costule apparently forming a single brown transverse line or band not prolonged into the segments.—*Aspidium, Bl. En. Fil. Jav. p. 153. Goniopteris aspera, J. Sm. in Hook. Journ. Bot. iii. p. 396. Polypodium asperum, Roxb. in Herb. Linn. (fide J. Sm.). P. scabrum, Herb. Roxb. (fide Wall. Cat. n. 2225).*

Hab. Java, *Blume*, in the western provinces, *De Vriese and Teijsmann, n. 217, Thos. Lobb. Luzon, Cuming, n. 272. Kamaon, Wallich.*—A noble species, in many respects approaching *N. cyatheoides*, but much larger, and different in various particulars.

29. N. (*Eunephrodium*) *abruptum*, Pr.; caudex?, stipes

very stout 2 feet and more? long glabrous pubescent in age, fronds ample 2-3 feet long 1-1½ foot broad firm coriaceous-chartaceous glabrous pinnated, pinnæ large 6 inches to 1 foot long ¾-1¼ inch broad subsessile from a truncated or short-cuneate broad base oblong finely acuminate shortly lobato-pinnatifid at the margin, lobes rounded obtuse and suberosotruncate or acute subfalcate (inclined towards the apex of the pinnæ), lowest pinnæ often dwarfed, costules slightly elevated numerous, veinlets six eight or ten pairs (according to the space between the costa and the sinus of the lobes) united and then forming a spurious intermediate costule, three or four only of the veinlets free within the short lobes, sori copious each on the middle of the veinlets in two distinct lines or series between each pair of costules never extending to the lobes, involucre rotundato-cordate subciliate or glabrous soon deciduous. (TAB. CCXLI. B.)—*Aspidium*, *Bl. En. Fil. Jav.* p. 154 (not *A. abruptum*, *Kze.*, which is of the *Lastrea*-section). *A. multilineatum*, *Wall. Cat. n.* 353. *Metten. Aspid.* p. 108 (in reference to *Wall. Cat.*, but excl. *N. mucronatum*, *J. Sm.*, and the references to *Cuming's nos.* 182 and 278). *Aspid. prionophyllum*, *Wall. Cat. n.* 355 (a trifling var. with the base of the pinnæ contracted and these sterile). *A. pennigerum*, *Bl. En. Fil. Jav.* p. 153, not of others. *A. truncatum*, *Gaud. in Freyc. Voy. Crypt.* p. 333. t. 10.

Hab. Java, *Blume, in Herb. Nostr.*, *De Vriese and Teijsmann*, n. 4(5?)45, 543, 537, *Millett.* Sumatra, n. 14, and Island of Menado, n. 231, *De Vriese and Teijsmann.* Penang, *Hance*, and Singapore, *Wallich, Cat. n.* 353. Dahumbang River, Borneo, *H. Low.* Moluccas, *Gaudichaud.* Ceylon, *Mrs. Gent. Walker, Gardner*, n. 1252 and 1104, *Thwaites*, n. 3271, elev. 2000-4000 feet. Indian Continent: *Mishmee* and *Sylhet*, *Griffith*; *Nilghiri*, *Beddome.* Pacific Islands: *Feejee*, *Harvey*; *Solomon's group*, *San Christoval*, *Milne*, n. 507 and 531. Tropical Africa: *Fernando Po*, *Vogel*, n. 62 and 124, *G. Mann*, n. 140, *Barter*; *Prince's Island*, *Barter*, n. 1924.—A very fine species, little understood because imperfectly described. It is somewhat allied to *A. cyatheoides* and to *A. ferox*, but the texture and the arrangement of the sori, etc., are very different; here the rows or series are equidistant, not only each pair belonging to the respective lobes of the pinnæ are equidistant between the costules and the sinuses, but equidistant as regards the adjacent pairs belonging to the adjacent lobes; thus exhibiting a series of equidistant lines on the pinnæ throughout. Some of my specimens sufficiently accord with the description and figure of *A. truncatum*, *Gaud.*, to induce me to refer that plant here.

30. *N. (Eunephrodium) sagittifolium*, *Moore*; "frond bipinnatifid" (pinnate, pinnæ pinnatifid) "membranaceous on both sides and as well as the rachis and stipes hirsute, pinnæ sessile (subcallose at the base of their insertion beneath, lowest ones reflexo-imbricate dwarfed semisagittate) linear-lanceolate

elongate acuminate pinnatifid, the segments falcato-oblong obtuse entire connected by a membrane lowest one above larger sometimes reflexed, sori biseriate confluent, involucre obselete."—*Aspidium sagittæfolium*, *Bl. En. Fil. Jav. p.* 153.

Hab. Mountains of Java, *Blume, in Herb. Nostr., De Vriese and Teijsmann, n.* 202, hairy on the veins beneath, and in every respect identical with Blume's plant. Malacca, *Griffith*, frond quite glabrous, stipes below hairy with copious subulate scales.—The very reduced sagittæform inferior pinnæ are indeed very remarkable, but the general structure of the pinnæ and the venation and arrangement of the sori are almost identical with our *N. abruptum*. I do not find dwarfed lower pinnæ in this group of Ferns to be constant. Blume says, "a tribus præcedentibus (*A. stipellatum*, *A. callosum*, and *A. pennigerum*) differt hirsutie frondis, lacinia infima sursum elongata sæpe reflexa, stipite pinnulis semisagittatis quasi-imbricato."

31. *N. (Eunephrodium) augescens*, Fée; caudex stout long-creeping, stipites 1–2 feet long ascending and slightly paleaceous at the base, fronds broad-ovate 1–3 feet long glabrous above, more or less downy beneath, coriaceous pinnate, pinnæ sessile 5–10 inches or a foot long  $\frac{1}{4}$ – $\frac{1}{2}$  an inch broad very long and finely acuminate more or less deeply and uniformly pinnatifid serrated at the apex, segments triangular-ovate subfalcate very acute or short and obtuse, terminal pinna the largest and longest, lowest pairs of veinlets united, involucre pubescent.—*Aspidium augescens*, *Link. Fil. Hort. Reg. Bot. Berol. p.* 103. *Kze. in Schk. Suppl. i. p.* 134. *t.* 59. *Metten. Fil. Hort. Lips. p.* 91. *Aspid. p.* 88. *Aspid. Serra, Eat. Fil. Fendl. et Wright, p.* 210.—*Sloane, Jam. p.* 90. *t.* 48. *f.* 1.

Hab. Jamaica, *Sloane, Wilson, Purdie*. Cuba, *C. Wright, n.* 923.—A very peculiar species, well represented both in *Sloane* and by *Kunze*, varying extremely in size, from a span to 4 feet long, including the stipes.

32. *N. (Eunephrodium) propinquum*, Br.; caudex very long creeping sometimes copiously and luxuriantly rooting as if growing in watery places, stipites varying much in length from 1–2 feet, fronds subcoriaceous 1–2 feet long glabrous or often more or less pubescent resinoso-glandulose especially beneath reddish-brown when dry rather glossy pinnated, pinnæ numerous shortly petiolate 3–5 inches long  $\frac{1}{4}$ – $\frac{1}{2}$  an inch or more wide linear-lanceolate acute rather than acuminate sometimes broader and cuneate at the base sometimes contracted pinnatifid one-third or halfway down to the costa, the segments rounded or ovate obtuse or acute, veinlets curved one or two of the lowest opposite pair united, sori near the middle of the veins or submarginal sometimes con-

fined to the lobes sometimes extending to the disk and not unfrequently forming a continuous intramarginal line following the course of the sinuses the whole length of the pinnæ, involucre reniform setose.—*Br. Prodr. Fl. Nov. Holl. p. 148. Pr. Tent. Pterid. p. 81. "Sw Adnot. Bot. p. 67" (1829). Polystichum, Gaud. in Freyc. Voy. Crypt. p. 430. Aspidium unitum, Sw. Syn. Fil. p. 47 (Metten.). Willd. Sp. Pl. v. p. 241. Schk. Fil. p. 34. t. 33. b. Metten. Fil. Hort. Lips. p. 91. Aspid. p. 102. A. gongylodes, Schk. Fil. p. 193. t. 33. c. very good. Aspid. Pohlianum, Pr. and Kze. A. obtusatum, Willd. Sp. Pl. v. p. 241. Sw. Syn. Fil. p. 48 and 248. Pteris, Willd. Phytogr. p. 13. t. 10. f. 1? Nephrod. unitum, Br. Prodr. Fl. Nov. Holl. p. 148. Aspidium, Sw. Syn. Fil. p. 47. "Aspid. pteroides, Sw.?" (Br.) Filix Zeylan., denticul. non ramosa. Burm. Zeyl. p. 98. t. 44. f. 1 (very good). Polypodium secundum, Wall. Cat. n. 301. Nephrod. paludosum. Liebm. Fil. Mex. p. 123, to which Mettenius refers N. Schaffneri, Fée, Sme Mém. Foug. p. 108.*

Hab. Ceylon, (*Burm.*) *Gardner, Thwaites*, n. 705. Probably throughout the Indian Continent, *Wallich* (Hindustan, Oude), *Khasya* and *Assam*, *Griffith, Simons*, and *Chittagong*, *Hooker fil. and Thomson*. *Madras Peninsula*, *Wight*, n. 14 and 124, *Beddome*, n. 142. *Malay Peninsula and Islands*: *Singapore*, *Wallich*; *Moluccas*, *Griffith*; *Java*, *Blume* (*A. unitum*), *Thos. Lobb*; *Borneo*, *Motley, De Vriese and Teijsmann*, n. 12, *N. Ilicos*, *Cuming*, n. 269 (*Nephrod. unitum*, *J. Sm.*). *China*, *Beechey* (*Aspid. resiniferum*, *Kaulf.*). *Hongkong*, *Dr. Diell, Urquhart*, n. 47, *C. Wright*. *Sandwich Islands*, abundant, *Beechey, Barclay, Dr. Diell, Seemann, Nuttall*. *New Holland (Brown)*, *All. Cunningham*. *Arnheim's Land and Melbourne*, *Mueller*; *Brisbane* (proliferous, the young plants still attached, and the upper part of the main frond with linear-hastate pinnæ). *Lizard Island*, *Macgillivray*. *Mauritius*, *Bojer*, etc. *Island of Don Diego Garcia*, *Bouton*. *Africa*: *Cape and Natal*, *Krauss, Sutherland, and Drège* (*Aspid. Ecklonii, Kze.*), *Zeyher*. *East Tropical Africa*: *Luabo River and Zambesi*, *Dr. Kirk, in Livingstone's Exp.* *West Tropical Africa*: *Fernando Po*, *Fogel*; *Algeria*, *Bové*. *Mexico*. *Liebm.* (*Nephrod. paludosum*, *Liebm. Fil. Mex. p. 123*). *Brazil*, *Raddi* (*Aspid. Serra, Fil. Bras. p. 31*), *Fox, Burchell, Armstrong*, etc. *Para*, *Spruce*, n. 459. *Guiana*, *Sagot, Leprieux, Parker*. *Jamaica*, *Dr. Wright, Wilson*, n. 743. *Guadeloupe*, *L'Hermier*.—All the specimens from the above localities are remarkably uniform. The names of *Aspidia unitum*, *propinquum*, *gongylodes*, and *Serra*, have been long familiar; but it has never been in our power to distinguish them at all satisfactorily. The first and last of them (*A. unitum* and *A. Serra*), as regards the plants of Schkuhr, are figured by that author on the same plate of his *Filices*, Tab. 33 b, and so like each other that I had considered them one and the same; but *A. Serra* is referred by Presl and Moore to *Lastrea*, and if that is correct, as I believe it to be, it needs not be considered here. In the matter of *A. unitum*, I follow Mettenius's views, and consider Sieber's plant so called as the authority. *A. gongylodes* I fear must be united with *propinquum*; but *propinquum* itself has been a puzzle to many. In this I am willing to take the accurate Brown for my guide, and I presume that Swartz, in his 'Adnotationes' (published in 1829), has adopted Brown's *propinquum* (published in



1810). But I do not see, from Brown's brief characters, how it differs from his *unitum*, except that it is said to be downy beneath, whereas *unitum* is described as *glabrous*. Burmann's figure well represents our plant; my reference to Schkuhr's *Aspid. gongylodes* is equally satisfactory for the pubescent state. And I have now little hesitation in considering most of the above synonyms and the localities, entirely taken from my own herbarium, correct.

33. N. (*Eunephrodium*) *unitum*, Sieb.; root long creeping underground densely rooting, stipites a span to a foot and more long stout glossy brown, fronds 1-2 feet long rigid-coriaceous oblong acuminate suddenly contracted and attenuated at the base (by the dwarfing of the pinnæ there) glabrous above cano-tomentose beneath especially on the rachis costæ and veins, pinnated, pinnæ numerous approximate 4-6 inches long erecto-patent from a truncated sessile sub-hastate base linear-oblong gradually acuminate 3-6 lines wide the margin pinnatifid, lobes short triangular ovate acute rigid the margins a little reflexed, veinlets very prominent beneath, three or four of the lowest pair uniting and at their junction excurrent and forming as it were a false or intermediate vein reaching to the sinus, sori copious on all the veins crowded at length confluent, involucre small reniform at length glabrous.—*Sieber, Syn. Fil. n. 43. Metten. Aspid. p. 107. Wall. Cat. n. 358 (not of Sw. Syn. Fil. p. 47, nor of Schk., which is A. propinquum, Sw.). Nephrodium, Schott. Polystichum, Gaud. in Freyc. Voy. Crypt. p. 325. Aspid. callosum, Bl. Aspid. lanuginosum, Bory, in Herb. Hook. (not of Willd. in Kaulf. En. Fil. p. 244, which is a tripinnate species). Aspid. aridum, Don. A. venulosum, Wall. Cat. n. 352. Polypod. scabridum, Wall. n. 302. Aspid. cucullatum, Bl. En. Fil. Jav. p. 151. Nephrod. canescens, J. Sm. in Hook. Journ. Bot. iii. p. 411 (not Wall.). Aspid. pteroides, Bl. (not Sw.? Nephrodium mucronatum, J. Sm. N. Smithianum, Pr.*

Hab. Mauritius, *Sieber, n. 43 and 292, Bojer, Wallich, Cat. n. 358, Telfair, and others.* Island of Johanna, East Coast of Africa, *Hutton, Lieut. Speke.* Madagascar, *Forbes, Lyall.* India, frequent: Himalaya, etc., *Hook. fil. and Thomson; Nilghiri, Wight, n. 115, Beddome, n. 138.* Malay Islands: Java, *Blume, Thos. Lobb, De Vriese and Teijsmann, n. 256, 521, 534, 544, 549, and 429; Malacca, Griffith; Borneo, Barber; S. Ilocos, Cuming, n. 254 (Nephrod. canescens, J. Sm.); Luzon, Cuming, n. 278 (N. mucronatum, J. Sm.).* Ceylon, *Gardner, n. 53.* China: Hongkong, *C. Wright.* Feejee Islands, *Harvey, Seemann, n. 736, Brackenridge, Milne.* Teviot River, N. Holl., *Fraser.* Pacific Islands, Coral Islands, *Beechey (N. propinquum, Hook. et Arn.).* New Caledonia *C. Moore.* Isle of Pines, *Milne.* Friendly and Society Islands, *Cuming, Nightingale, Mathews; and Loo Choo ("Neph. sophoroides, Desr.")*.—A well-marked and very distinct species of singularly rigid habit, and very prominent venation

on the under side of the frond. Moore refers the *Aspid. Hookeri*, of Wallich, to this species, but I think incorrectly.

34. *N. (Eunephrodium) pennigerum*, Bl., *sub Aspid.*, not Sw.; "frond bipinnatifid (pinnate, pinnæ pinnatifid) membranaceous subpubescent on the costa above and the veins beneath, pinnæ (inferior ones remote smaller and subtriangular) sessile (subcallous at the point of insertion beneath) linear-lanceolate elongated very acuminate subcuneate at the base pinnatifid, segments falcato-ovate obtuse entire united by a pellucid membrane lowest ones subequal, sori biseriate approximate, involucre minute, rachis and stipes tetragonal puberulous furrowed above."—*Bl. En. Fil. Jav. (excl. Syn.)*.

Hab. Java, *Blume, Millett*. Penang, *Lorraine, Hance*, n. 136. Malay Archipelago, *Sir Wm. Norris*. Johanna Island, East Coast of Tropical Africa? *Sir F. Grey*.—This is evidently a very large-growing Fern, but belonging to a group of which the species are extremely difficult to define. All my specimens from the above localities quite correspond with Blume's authentic ones, save that from Johanna Island, which, however, chiefly differs in its dark full green colour; whereas the Malayan specimens are reddish-green. About four pairs of the veinlets of each segment unite, and there is a uniting membrane between the segments as in *N. brachyodon*. I do not find the smaller subtriangular lower pinnæ which Blume speaks of; and there is certainly in some an approach to *N. abruptum*, to which indeed I had referred it, at p. 78, perhaps incorrectly; others look quite peculiar, and are a foot long, falcate or straight, with very acuminate points.

35. *N. (Eunephrodium) Fendleri*, Hook.; stipes 3 feet and more long brown glabrous, at the base only slightly downy and scaly, frond of about the same length and more than a foot broad coriaceous-membranaceous oblong-ovate pinnated, pinnæ (29 in my specimen) large rather distant, terminal pinnæ free large and petiolated, lateral ones all opposite sessile oblong very finely acuminate 1–1½ inch broad pinnatifid more than halfway down to the costa with ovate subfalcate segments, but the very narrow sinus is united by a brownish pellucid membrane, veins very conspicuous four or five pairs uniting but again prolonged and running up on each side the uniting membrane as far as the free portion of the sinus, sori large very conspicuous all marginal confined to the segments or not extending further down than the united portions of the sinus, involucre reniform (?) corrugated in age and much concealed by the copious pulvinate mass of capsules.—*Eat. Fil. Wright et Fendl. in Mem. Acad. An. Sc. N. Ser. vol. viii. p. 210*.

Hab. Tovar, Venezuela, *Fendler, Fil. n. 372*.—A very fine and remarkable species, yet so closely resembling our next species in form and size, and in the

opposite pinnae, that, but for the constant presence of distinct involucre in the species before us, and the large sori quite confined to the margin of the lobes, one would say the two were identical. The position of the sori here bears nearly the same relation to the following species as our *N. terminans* does to *N. propinquum*.

36. *N. (Eunephrodium) brachyodon*, Hook.; "frond ovate-oblong subglabrous glossy above pinnated, pinnae subopposite shortly petiolate elongato-lanceolate acuminate pinnatifid with a deep membranaceous line at the sinuses (sinibus alte membranaceis), costa glabrous sulcated flexuose towards the apex, with a gland at the base, the teeth or laciniae very short subfalcate margined obtuse, sori uniseriate, rachis puberulous," *Kze.*; to which may be added from my own specimens, caudex short stout erect knotted, stipites 1-2 feet long glabrous, frond 1½-2 feet, pinnae almost always opposite large six to eleven pairs and a terminal petiolated one 6-8 inches long, generally subfalcate often 2 inches broad, segments rather variable in length, sometimes the two lowest pairs of veinlets unite below the membranaceous sinus sometimes two or three pairs approximate and run parallel and scarcely unite, sori equidistant between the margin and the costule (never marginal), involucre reniformi-cordate soon deciduous or wanting.—*Polypodium brachyodus*, *Kze. in Linnæa*, ix. p. 48. *Phegopteris brachyodus*, *Metten. Phegopt.* p. 21. *Ph. Seemannii*, *J. Sm. in Seem. Bot. of the Herald*, p. 228. t. 49. *Filix non ramosa*, etc., *Plum. Fil. t.* 21?

Hab. Tropical America: Pampayaco, Peru, *Pæppig*; Coast of Ecuador, and Panama, various parts of the coast, *Seemann*, *Lieut. Wood*; foot of Chimborazo, *Jameson*, *Spruce*, n. 5720; Galapagos, *Lieut. Wood*; St. Vincent, *Rev. L. Guilding*; Dominica, *Dr. Ingray*.—Mr. Smith's figure of *Phegopteris Seemannii* well represents one form of this plant, and which Mettenius, I think, correctly refers to *Polypod. brachyodus*, *Kze.*; but in one of Dr. Seemann's specimens from the Bay of Chico, in my herbarium, and on one from Mr. Spruce, it is clearly to be seen that it is an indusiate Fern, and, as I have already observed, nearly allied to *Nephrodium Fendleri*, next to which I place it.

37. *N. (Eunephrodium) stipulare*, Moore; "fronds pinnate, pinnae pinnatifid entire, stipules pinnatifid acuminate, sori approximate."—*Willd. Sp. Pl. v. p.* 239. *Filix ad alas foliosa*, *Plum. Fil. xviii. t.* 23.

Hab. Martinique, *Plumier*.—A very large Fern, 6 feet high, and a very remarkable one, if there be no exaggeration in the figure; for each pinna (many of them a foot long) bears a lesser one, 1-2 inches long, from its superior base. It is probably a monstrosity of some well-known species.

§ LASTREA.—Veins and veinlets free, not connected or connivent, except in some very rare or exceptional cases. *Lastrea*, Pr. and others. (See my remarks on the limits of the genera of *Aspidiaceae* at p. 5 of this volume, and p. 6, for my views on *Aspidium* and *Nephrodium*.)

\* Fronds not compound; that is, the divisions do not extend quite to the rachis. Sp. 38, 39.

38. N. (*Lastrea*) *pedatum*, Hook.; caudex short thick sub-horizontal paleaceous, stipites tufted 4–6 inches long rather stout ebeneous, fronds coriaceous 3–5 inches long cordate pedato-trilobate or tripartite, lateral lobes dimidiato-cordate with the lower margin only lobed, terminal one uniformly pinnatifido-lobate, veins free or occasionally anastomosing, sori scattered, involucre reniformi-cordate.—*Aspidium*, Desv. *Mém. Soc. Par.* vi. p. 244. Kze. in Schk. *Fil. Suppl.* p. 179. t. 75. Metten. *Aspid.* p. 117. t. 18. f. 4. *Lastrea*, Moore. *Camptodium*, Fée, *Gen. Fil.* p. 297, and 8me *Mém.* p. 134.

Hab. West Indies: Jamaica, Wilson, Bancroft, etc.; Cuba, Linden, n. 1906, Wright, n. 997.—A small plant with the habit of *Euaspidium* or *Sagenia* (and hence Mettenius places in the same section with *Aspid.* *cicutarium*), but the veins very rarely anastomose.

39. N.? (*Lastrea*?) *Braunianum*, Hook.; “frond membranaceous cordato-ovate acute deeply bipinnato-partite pilose on the costa and veins, primary segments lanceolate acuminate diminishing in size upwards, the lowest ones oblique, all of them confluent with a broad wing, secondary segments connected by acute sinuses, superior ones falcato-ovate entire, lowermost ones oblong acute serrate, lowest ones of the inferior side of the lowest segments elongated pinnatipartite, tertiary veins generally forked soriferous at the apex of a superior branch and generally abbreviated, sori in the middle between the costules and the margins of the segments, involucre glanduloso-pilose horseshoe-shaped or auriculate.” *Aspidium Braunianum*, Karst. *Fil. Colomb.* p. 63. t. 31.

Hab. On trees and stones in shady woods of the eastern Cordillera of Bogotá, near Villavieja, Karsten.—This is quite unknown to me. The beautiful figure represents a frond rather more than a foot long, with somewhat of the habit of the *Sagenia*-group of *Euaspidium*, but with free veins, and, however deeply bipinnatifid, it is still a simple (not a compound) frond, all the segments being united by a broad and acutely-lobed wing. The involucre (at least at f. 7, though not at f. 6) represents that kind with a decurrent lobe, common in many species of *Athyrium*, especially *Ath.* (or *Asplenium*) *Filix-femina*.

\*\* Pinnate, pinnae pinnatifid. Stipites jointed above or below the middle. *Arthropteris*, J. Sm. *Sp.* 40–42.

40. N. (*Lastrea*) *albo-punctatum*, Desv.; caudex very long.

more or less squamulose, stipites scattered 3 inches to a span long jointed above or below the middle, fronds 5-12 inches long ovato-lanceolate pinnate submembranaceous more or less hirsutulous, pinnæ truncated at the base sessile oblong-lanceolate scarcely acute uniformly and about halfway down to the rachis pinnatifid, lobes ovato-oblong obtuse entire with marginal white dots above, sori reniform hairy.—*a. Borbonicum*; caudex scandent very scaly, stipes jointed below the middle.—*Nephrodium albo-punctatum*, *Desv. Mém. Soc. Linn. vi. p. 255. Hook. Fil. Exot. under t. 89.* *Lastrea, Pr. Aspid. (Lastrea) Boutonianum, Hook. Ic. Plant. t. 931.*—*β. Nigritianum*; caudex nearly naked blackish, stipes jointed below the apex. *Hook. Fil. Exot. t. 89.* *Aspidium leucostictum, Kze. in Linnæa, xxiii. p. 310. Metten. Fil. Hort. Lips. p. 90. t. 18. f. 4-6.* *Arthropteris albo-punctata, J. Sm. Cat. Cult. Ferns, p. 6.*—*γ. Fijianum*; caudex creeping very black filiform scaleless, stipes jointed below the middle but distant from the base. *Hook. Exot. Fil. under t. 89.* *Lastrea articulata, Brack. in Fil. U. S. Expl. Exp. p. 191. t. 20. f. 1.*

Hab. Var. *α.* Bourbon and Mauritius, frequent. *β.* Tropical Africa: West Coast, Sierra Leone, and ascent of the Quorra, *Barter*; Fernando Po, *Gustav Mann.* *γ.* Feejee and adjacent islands, *Brackenridge, Milne, Seemann.*—The above are trifling variations of one and the same species.

41. *N. (Lastrea) Webbianum, Hook.*; caudex very long creeping filiform tomentose rather than scaly, stipites distant, fronds 2-4 inches long jointed near the middle, fronds 6-9 inches long glabrous broad-oblong acuminate pinnated, pinnæ alternate horizontal from an obliquely cuneate base with a superior auricle oblong-lanceolate obtuse lobato-pinnatifid at the margin, the apex entire dotted with white above, sori in a single series between the margin and the costa, involucre?

Hab. Amboyna (*P. B. Webb, Esq.*, I believe, collected by *Labillardière*).—The glabrous fronds, the shallow lobes of the pinnæ, and the very distinct auricle, together with the single range of sori on the disk between the margin and the costa, are the characteristics of this species.

42. *N. (Lastrea) subbiauritum, Hook.*; stipes jointed?, frond 14 inches long lanceolate acuminate pubescent especially beneath submembranaceous pinnate, pinnæ numerous opposite horizontally patent from a truncated sessile base oblong-lanceolate acuminate crenato-serrated at the margin with an auricle above and below, bearing white dots on the upper side, sori scattered not extending to the lobes or teeth, involucre very small cordate.

Hab. Bourbon, in *Herb. Hook.*, from *Herb. Mus. Par.*—My only specimen has the appearance of the stipes being broken off at the joint. That circumstance, together with the white cretaceous dots, induce me to refer it to the *Arthropteris*-group. It is well distinguished by its large size, dark colour, pubescent fronds, minute sori, toothed rather than pinnatifid, and pinnae which have two auricles at the base, a superior and inferior one.

\*\*\* *Pinnate.* *Pinnae entire or serrated, rarely pinnatifid.* *Sp.* 43–48.

43. N. (*Lastrea*) *Imrayanum*, Hook.; caudex?, stipes?, frond (imperfect at the apex)  $2\frac{1}{2}$  feet long subcoriaceous-membranaceous pinnated, pinnae numerous 6 inches long  $\frac{3}{4}$  of an inch wide horizontally patent from an obliquely-cuneated sessile base lanceolato-ensiform very finely serrated (not at all lobed or pinnatifid) towards the apex, lower ones subopposite subauricled, upper ones subfalcate with the lower base decurrent superior base rounded, veins all pinnated, sori (quite young) very minute copious dorsal or terminal on the veinlets scattered, involucre cordate? (TAB. CCXLII. A.)

Hab. Dominica, *Dr. Imray.*—A very fine species, and very distinct from any with which I am acquainted. The rachis is stout, firm, of a dirty-brown colour, semiterete at the back.

44. N. (*Lastrea*) *macrotis*, Hook.; caudex short erect copiously rooting, stipites tufted a span to  $1\frac{1}{2}$  foot long, fronds subcoriaceous-membranaceous  $1\frac{1}{2}$ –2 feet long dark-green pubescenti-villous on both sides especially on the costae beneath ovato-lanceolate acuminate pinnate, pinnae 3–6 inches long  $\frac{1}{2}$  an inch or more wide subsessile from a truncated base furnished with a very large acuminate auricle above, rounded beneath oblong-lanceolate acuminate subfalcate, lowest ones deflexed, margins crenato-lobate, lower ones pinnatifid with rather short ovate segments, upper ones entire, veins free, but lowest veinlets very approximate, sori copious subtriseriate between the margin and the costa, involucre very hairy. (TAB. CCXLII. B.)

Hab. Eastern Peru, near Tarapota, *Spruce*, n. 3979.—This has somewhat the habit of large specimens of *N. molle*, but the veins and veinlets are all free, and the very large acuminate auricles, out of all proportion to the other short lobes of the pinnae, are very characteristic.

45. N. (*Lastrea*?) *decipiens*, Hook.; stipes (imperfect) slender scarcely paleaceous, fronds 8–10 inches long coriaceous ovato-lanceolate acuminate glabrous pinnated pinnatifid at the apex, pinnae horizontally patent  $2$ – $2\frac{1}{2}$  inches long subfalcate from a truncate or subcordate subpetiolate inauriculated base rounded above and below narrow-oblong acuminate

entire or serrated chiefly above the middle, lower pinnæ distant, lobes of the apex obtuse, veins pinnated twice or thrice forked, sori solitary dorsal on the lowest superior veinlet, involucre coriaceous rotundato-cordiform and subpeltate, rachis crinite with dark brown subulate scales. (TAB. CCXLIII.)

Hab. China: Foo-chow-foo, *Alexander*.—It is difficult to say if the involucre is that of a *Polystichum* or *Lastrea*. The veins are free. The habit is very much that of our *N. podophyllum* (n. 48), but the frond is very much smaller, the stipites are more slender and, as well as the rachis, want the large brown peculiar scales of that species, the auricles of the pinnæ are entirely absent, and the superior pinnæ gradually become coadunate into a pinnatifid apex with blunt segments.

46. *N. (Lastrea) semihastatum*, Hook.; caudex small short copiously rooting, stipites tufted 2–3 inches long hairy, fronds 6–8 inches long pubescenti-hirsute especially beneath oblongo-lanceolate pinnated pinnatifid at the apex, pinnæ less than an inch long horizontal approximate subsessile oblong-falcate very obtuse crenate at the margin auricled at the base above rounded beneath, veins pinnated, sori small, involucre “ciliated,” rachis villous with patent hairs.—*Aspidium*, *Kze. in Linnaea*, ix. p. 91. *Metten. Aspid.* p. 75.

Hab. Peru, dense woods at Pampayaco, *Pæppig*.—This appears to be a good species, hitherto found by no one but *Pæppig*.

47. *N. (Lastrea) Sieboldi*, Hook.; caudex short thick densely paleaceous, stipites tufted 6 inches to a foot long, fronds about a span long carnosio-coriaceous pinnate, pinnæ 3–7–9 subpetiolate, lateral ones horizontally patent 6–8 inches long an inch wide elongato-oblong acuminate subfalcate truncate or subcordate at the base hirsutulous beneath irregularly crenato-lobate and serrated, *sterile* ones broader, terminal pinna very large lobed or subpinnatifid at the base, veins dichotomosely fascicled terminating within the margin, sori dorsal on the veinlets very large and prominent, involucre reniform convex.—*Hook. Fil. Exot. t.* 31. *Aspidium*, *Van Houtte. Metten. Fil. Hort. Lips.* p. 87. *t.* 20. *f.* 1–4. *Lastrea* and *Pycnopteris*, *Moore. Lastr. podophylla*, *J. Sm. (not Hook.)*

Hab. Japan, *Siebold*.—A well-defined and most distinct species, but at present, strange to say, better known in gardens than in the herbarium.

48. *N. (Lastrea) podophyllum*, Hook.; caudex a thick scaly rhizome, stipites tufted a span to a foot long with in-



tensely black subulate falcated scales at the base, fronds coriaceous a span to a foot long coriaceous ovato-oblong glossy pinnate, pinnæ remote 10-13, terminal one often longer than the rest, all petiolate lanceolate 3-6 inches long  $\frac{1}{2}$ -1 inch wide coarsely serrated or lobato-subpinnatifid obtuse at the base or with two rounded or orbicular lobes there, veins internal pinnated variously soriferous on the back, involucre orbicular with a narrow sinus, rachis and costæ stout pale brown glossy.—*Aspidium* (*Lastrea*) *podophyllum*, *Hook. in Kew Garden Misc. v. p. 236. t. 1, and vol. ix. p. 339 (excl. Syn. of Metten.)*. *Metten. Aspid. p. 53. Bentham, Fl. Hongkong. p. 454.*

Hab. China: Hongkong, frequent, *Champion, Bowring, Urguhart, Harland, Wilford, C. Wright, Lorraine*; Chusan, *Alexander*.—A most distinct species, by no means to be confounded with *N. Sieboldi*.

\*\*\*\* *Pinnate. Pinnæ uniformly pinnatifid. Sp. 49-98.*  
(*Thelypteris-group. Sp. 49-60.*)

49. *N. (Lastrea) Thelypteris*, Desv.; caudex very long slender branched creeping black copiously rooting, stipites distant about a foot long slender stramineous black at the base, fronds firm-membranaceous 1-2 feet long oblong acuminate glabrous or pubescent on the costæ beneath pinnated, pinnæ subopposite patent 2-4 inches long sessile linear-oblong acuminate pinnatifid almost to the apex and down nearly to the rachis, segments ovate or oblong acute rarely subfalcate quite entire, veinlets simple the lower once or twice forked, sori copious nearer the recurved margin than the costule, involucre cordato-reniform with glandular hairs at the margin deciduous.—*Hook. Brit. Ferns, t. 13. Aspidium, Sw. Syn. Fil. p. 57. Willd. Sp. Pl. v. p. 249. Schk. Fil. p. 51. t. 52. Sm. Engl. Bot. t. 400. Metten. Aspid. p. 112. Hook. and Arn. Brit. Fl. ed. viii. p. 583. Asa Gray, Man. of Bot. p. 526.*— $\beta$ . *squamulosum*; with nearly orbicular scales on the rachis of the pinnæ and often at the base of the costule of the segments.—*Schlecht. Fil. Cap. p. 23. t. 11. A. Thelypteris, Pappe and Rawson. Nephrod. squamulosum, Hook. Fil. Fl. N. Zeal. ii. p. 30. Aspid. rivulosum, Thunb., and probably A. invisum of Forster. A. parasiticum, Link, Hort. Berol.*

Hab. Boggy marshy ground throughout Europe and North America. In Asia: Kashmir, *Jacquemont, n. 35, T. Thomson*; Khasya, *Hook. fl. and Thomson, n. 246; Manchuria, Wilford*; Amur, *Maximowicz*.—Var.  $\beta$ . Cape of Good Hope, frequent, New Zealand, *Colenso, Hawtune*.—A well-known Fern, chiefly of temperate regions in the northern hemisphere; but occurring in a slightly-altered form in South Africa and New Zealand.

50. N. (Lastrea) *Noveboracense*, Desv.; "frond pinnate oblong-lanceolate in outline tapering below, from the lower pinnae (2—several pairs) being gradually shorter and deflexed, the lobes flat broadly-oblong, their veins all simple, except in the lowest pairs, bearing scattered sori (never confluent) near the margin." Asa Gray.—*Aspidium*, Sw. Syn. Fil. p. 55. Willd. Sp. Pl. v. p. 248. Schk. Fil. p. 47. t. 46. A. Gray, Man. of Bot. p. 597. Chapm. Fl. S. U. St. p. 534? *Polypodium*, Linn. *Lastrea*, Pr. *Nephrod. thelypteroides*, Mich. *Aspid.*, Sw.

Hab. North America: swamps and moist thickets, common in the North United States, Asa Gray; low grounds, North Carolina and northward, Chapman; Canada (Linn.), Goldie, in *Herb. Nostr.*—Of this species, common as it is said to be in the North United States, I have never received it but once from an American botanist, with any name of authority, and that was from my friend Dr. Torrey: in this there is no difference in the outline of the frond from that of our common *N. Thelypteris*, and the pinnae are equally deeply pinnatifid; but the costæ beneath are hairy, with longish white hairs; the veinlets are all entire; the sori are less abundant, apparently a little more remote from the margin, in consequence of that margin not being revolute, as is the case in the older state of *N. Thelypteris*. I have precisely the same form from Canada (Goldie), and I considered the difference so slight, that I believed that I was justified in saying, in my *Fl. Boreali-Americana*, that the "two supposed species were identical." Other botanists, however, are of a different opinion, and Dr. Asa Gray has expressed the differences in his specific character as above quoted, and added, "nearly the same as *Thelypteris*, except the points mentioned." But allowing this to be distinct, I think we have something yet to learn from American botanists. Neither my numerous British nor American specimens of *Thelypteris* have the inferior pinnae of the frond the longest, "the frond diminishing in length from near the base to the apex;" and one of my finest specimens of true *Thelypteris* from Connecticut has the four lowest pairs of pinnae very much dwarfed, giving quite a tapering outline to the lower part of the frond, as dwelt upon in the character of *N. Noveboracense*; we have there the simple veinlets, except in the lowest pairs, where they may be "forked," the plane margin of the segments, and the non-confluent sori, not in themselves very important characters as the chief marks of distinction. Mettenius dwells on the same distinctions: "Ab *Asp. Thelypteride* differt, segmentis inferioribus sensim decrescentibus, nervis tertiariis tantum ad basin laciniarum furcatis, soris distinctis margini laciniarum subapproximatis."—I now turn to the *Noveboracense* in Mr. Chapman's 'Flora of the Southern States.' His specimen now before me from Florida, is much larger in all its parts than my plant from Dr. Torrey, the pinnae much less deeply pinnatifid, little more than halfway down to the rachis, and the opposite basal veinlets (all of them simple) instead of being directed to the margin of the segments, meet and closely approximate, if they do not sometimes join, below the sinus. In short, this plant, certainly very distinct from *Thelypteris*, and equally so from *Noveboracense*, I refer along with similar specimens from southern North America, to *N. (Lastrea) patens* (n. 61), the same as *Aspid. molle* of Sillim. Journal, and further recorded under that name by Chapman as a native of "Florida to South Carolina."

51. N. (Lastrea) *Oreopteris*, Desv.; caudex short erect or decumbent copiously scaly, stipites short (2—4 inches) tufted scaly at the base, fronds 1½—2 feet long firm-membranaceous.

ous broad-lanceolate gradually tapering and attenuated below glandular pinnated, pinnæ 2–3 inches long patent sessile from a broad base lanceolato-acuminate deeply (more than halfway down) pinnatifid, from near the middle of the frond becoming gradually shorter downwards, segments plane nearly entire oblong very obtuse, veinlets simple or forked, sori quite marginal, involucre very delicate membranaceous more or less toothed at the margin soon obsolete, rachis often subulato-squamose, costæ subpubescent.—*Hook. Brit. Ferns*, t. 14. *Aspidium*, *Sw. Syn. Fil.* p. 50. *Willd. Sp. Pl.* p. 247. *Schk. Fil.* p. 37. t. 35, 36. *Hook. et Arn. Brit. Fl. ed. viii.* p. 583. *Metten. Aspid.* p. 92. Polypodium, *Engl. Bot. t.* 1019. *Lastrea*, *Pr.*

Hab. Europe, frequent in hilly mountain regions, Norway in the north to Spain in the south; quite confined apparently to temperate and northern regions.—The fronds yield a balsamic fragrance, residing no doubt in the copious resinous glands.

52. N. (*Lastrea*) *oligocarpum*, Hook.; “rhizome erect, fronds 1–1½ foot long membranaceous together with the stipes canescently-pilose, on both sides pubescenti-hirsute lanceolate pinnate, pinnæ shortly petiolate 2 inches long from a truncated base linear-oblong deeply pinnatifid acuminate in the attenuated serrated apex, segments oblong or linear-oblong obliquely truncato-rotundate at the apex entire or subrepand, lowest basal ones of the same size or larger, sori near the margin of the segments approximate, involucre dimidiate-reniform thin membranaceous setose fugacious.” *Metten.*—*Aspidium*, *Kunth, Syn. Pl. Am. i.* p. 78. *Metten. Hort. Fil. Lips.* p. 90. t. 18. f. 8 (*involucre*). *Aspid.* p. 77. Polypod., *Willd. Sp. Pl.* v. p. 201. *P. leptosorum*, *Kze. in Linnæa*, xxiii. p. 320. Polypod. pubescens, *Raddi, Fil. Bras.* p. 23. t. 34. *P. Lasiesthes*, *Kze. in Linnæa*, xxiii. p. 300 (in part, *Metten.*). *Aspid. consanguineum*, *Kl. in Linnæa*, xx. p. 387. *Aspid. rivulorum*, *Raddi*?

Hab. Peru, Columbia, Venezuela (*Mettenius*), Ecuador, *Jameson, Spruce*, n. 5721. Brazil, *Raddi, Gardner*, n. 113, 5319, *Pæppig, Mathews, Herb. Ruiz and Pavon*. Columbia, *Funck and Schlim*, n. 974, *Moritz*, n. 41 and 44 bis (Pol. consanguineum, *Kl.*). West Indies, Mexico.—*Raddi*’s figure of his *Polypod. pubescens* is quoted as an authority for the *Aspid. oligocarpum* of Kth. It differs from the *rivulorum* of *Raddi* in the smaller (not a foot long) fronds, oblong-ovate in form, that is, only having one pair of short basal pinnæ, and consequently no long attenuated base to the fronds; the segments of the pinnæ are of the same shape as those of *A. rivulorum*, with six sori instead of eight, but equally destitute of involucre.—Now tropical America, from the Atlantic to the Pacific, unfortunately abounds in all sorts of intermediate forms, and I find it impossible, in the absence

of any useful diagnostic remarks of authors, to say which belongs to the one and which to the other species. I fear the two are not really different; and so difficult is it to see an involucre, that but for Mettenius having so accurately described it, I should have preferred to retain it in *Polypodium* (§ *Phegopteris*).

53. N. (*Lastrea*) *conterminum*, Desv.; "caudex? (stout erect in some of my specimens), stipes 1-2 feet long, fronds rigidly membranaceous on both sides at the costæ more thickly puberulo-hispid, beneath laxly clothed with minute glands, 1-2 feet long lanceolate or linear-lanceolate attenuated at each extremity acuminate pinnated, pinnæ numerous sessile subopposite in the middle the longest  $1\frac{1}{2}$ -4 inches long 4-6 lines wide rectangularly patent from a broader base elongato-oblong gradually attenuated acuminate pinnatifid, the produced apex subentire, lower ones gradually diminishing, the lowest remote very abbreviated, segments oblong subfalcate obtuse entire, basal ones on the superior side the largest, costules generally spreading at an angle of 35-45° from the costa, sori nearer the margin than the costule, involucre reniform conspicuous membranaceous setose at the margin and clothed with sessile glands." Metten.—Desv. *Mém. Soc. Linn.* vi. p. 255. *Aspidium*, Willd. *Sp. Pl.* p. 249. Metten. *Aspid.* p. 78. *Polystichum*, Gaud. in Freyc. *Voy. Bot.* p. 328. *Lastrea*, Pr. *Polypod.* Plumieri, Desv. *Journ. Bot.* iv. p. 265. *Nephrodium* Panamense, Pr. *Rel. Hænk.* i. p. 35. *Lastrea*, Pr. *Aspid. polyphyllum*, Klfs. in *Flor.* 1823. p. 362; *En.* 338. *Lastrea*, Pr. *Aspid. blepharochlæna*, Kze. (in part.) *Polypod. concinnum*, Sieb. *Fl. Martini*, p. 241. *Aspid. rivulorum*, Kze. in *Linnæa*, ix. p. 43.—Var. *Thouarsianum*; fronds exceedingly coriaceous villosa-tomentose.—*Polypod. tomentosum*, Thouars, *Fl. Trist. d'Acugna*, n. 31. *Aspid. bifidum*, Carmich. in *Linn. Trans.* v. 12. p. 511.

Hab. Tropical America. Specimens in my herbarium I refer to this are from West Indies, Guadeloupe, *L'Hermier*; Cuba, *C. Wright*, n. 721 and 820; Jamaica, *Macfadyen*, *Bancroft*, *Wilson*, *Alexander*; Martinique, *Belanger*, n. 447; Porto Rico, Venezuela, *Fendler*, n. 178; Peru, *Mathews*, n. 1248, 1849, 3286, *Lechler*, n. 1565; Ecuador, *Spruce*, n. 5714, Tunguragua, n. 5372, Rio Verde, n. 5297 and 297 A? n. 5717, Tarapota, n. 4038; Valparaiso, *King*; Bolivia, *Bridges*; Venezuela, *Fendler*, n. 178; Mexico, *Galleotti*, n. 6306; Brazil, *Mr. Fox*, *Forbes*, *Gardner*, n. 5318, 5316.—Var. *β. Thouarsianum*; *Tristan d'Acunha*, *Thouars*, *Carmichael*.—Best distinguished perhaps by the copious dwarf pinnæ at the lower part of the frond, and the rigid habit. This species has been confounded with *N. rivulorum*, from which it is distinct, Mettenius assures us, by the absence of the gland at the insertion of the pinna, and by the oblique antrorse segments.—I refer hither, with some little hesitation, the *Polypod. tomentosum* of Thouars, because Carmichael places it under *Aspidium*, although Thouars says, twice over, "punctis fructiferis nudis," and my own ex-

cellent specimen does not show the trace of an involucre. The frond, however, is very coriaceous and hairy, and the caudex is stout but subrepent.

54. *N. (Lastrea) crinibulbon*, Hook. ; caudex stout ascending, stipites tufted dark brown 7-10 inches long subflexuose thickening at the base glanduloso-pilose as well as the rachis and crinite with blackish hair-like spreading scales which arise from a minute tubercle or bulb, 10-16 inches long dark green membranaceous firm viscido-pilose especially beneath and on the veins above pilose with long white pellucid hairs ovate acuminate pinnate pinnatifid at the apex, pinnæ rather distant 2-4 inches long spreading lowest pairs deflexed and distinctly petiolate the rest sessile oblong-lanceolate acuminate deeply pinnatifid nearly to the costa, the acuminate apex nearly entire, segments oblique scarcely falcate subacute nearly entire, veinlets about five on each side the costule oblique each bearing a sorus near the apex and just within the margin, involucre membranaceous brown reniform sometimes with a deep sinus and the lobes unequal. (TAB. CCXLIV.)

Hab. Island of St. Thomas, West Coast of Tropical Africa, on mountains, alt. 2000 feet, *Gustav Mann*.—A very distinct species, with fronds not much unlike in general appearance *Nephrod. (Lastrea) crinitum*; but the clothing of the stipes and rachises, and of the costæ and veins, is very different. There is a short and viscid pubescence on the stipes and rachis of a yellowish hue, and longish black hair-like scales arising from a little tubercle or minute bulb.

55. *N. (Lastrea) exiguum*, Hook. ; "fronds pinnate linear acuminate, stipes and rachis short villosa-tomentose, pinnæ ovato-falcate very obtuse shortly petiolate, lowest ones deflexed subcordate at the base auriculate above, veins slender forked, sori round dorsal, receptacle none, capsules globose, annulus of 13-14 articulations broad, spores short ovoid."—*Fée, 6me Mém. Fil. Nov. p. 13. t. 2. f. 4 (under the name Phegopteris nervosa)*. *Lastrea exigua, J. Sm. in Hook. Bot. Journ. iii. p. 412*. *Aspidium exiguum, Kze. in Metten. p. 76*. *Physematium Philippinum, Pr. Epimel. Bot. p. 34*.

Hab. Philippine Islands, *Cuming*.—Of *Cuming's* specimens, *M. Fée* (whose figure shows what plant he means) quotes *Cuming*, "sine numero;" *Mr. J. Smith*, "Cum. Luzon, n. 251 and 272." *Dr. Mettenius* the same, but he makes two varieties,  $\alpha$  and  $\beta$ ; to the former he attaches *Cu n. XXI.*, and to  $\beta$  he gives *Cum. 251 and 272*. *Presl* for his *Physematium* refers to *Cum. "n. 251, in part."* My own specimens (among the first selected from *Cuming's* collections) of 251, from *S. Ilocos*, and *n. 274, Luzon*, are, I suspect, like those of other authors, in a very imperfect state of fructification, and have hence given rise to different views as to the genus; yet I believe all are referable to one species, and that one possessing no striking characteristic features. The general habit, size,

etc., are a good deal those of our *Nephrod. Webbianum* from Amboyna, but these want the creeping filiform caudex, and the joint of the stipes.

56. N. (*Lastrea*) *gracilescens*, Hook.; caudex rather thick horizontal creeping on the surface of the ground scaleless copiously rooting beneath, stipites very numerous and crowded on the upper surface of the caudex slender a span to a foot long stramineous-brown, fronds a span to  $1\frac{1}{2}$  foot and more long membranaceous oblong-ovate or sublanceolate acuminate pinnated, pinnatifid at the apex, pinnæ sessile 2–3–4 inches long nearly  $\frac{1}{2}$  an inch wide oblong acuminate deeply pinnatifid, segments oblong obtuse plane quite entire, veins distant all simple, sori small nearer the margin of the segments than the costules, involucre small reniform glabrous soon obsolete.—*Aspidium*, *Bl. En. Fil. Jav.* p. 155. *Aspidium*, *Hook. Kew Gard. Misc.* ix. p. 338. *Aspid. Thelypteris*, *Benth. Fl. Hongkong. (viz Sw.) A. glanduligerum*, *Kze. Analecta Pteridogr.* p. 44? *Metten. Aspid.* p. 86.

Hab. Java, *Blume, in Herb. Nostr., De Vriese and Teijsmann*, n. 548? Nepal? *Wallich* (large). Khasya, *Griffith. Simla, Hooker fl. et Thomson*, n. 247. b. North-west India?, *Edgeworth* (frond downy). Hongkong, *Harland, Hance, Wilford*, n. 170. North China, *Alexander*.—Mr. Benthham refers this to the European *N. Thelypteris*, but of the correctness of this I feel doubtful; the venation is that of the North American *Noveboracense* rather than of *Thelypteris*, and the margins of the segments are not revolute, nor the sori so near the margin. Nor am I sure but what I have myself brought here specimens which are at variance with the true *gracilescens* of Blume, viz. such as have the lower pinnæ more or less dwarfed.

57. N. (*Lastrea*) *calcaratum*, Hook.; “frond bipinnatifid (viz. pinnate with the pinnæ pinnatifid) membranaceous beneath pubescent at the costa, pinnæ sessile lanceolate acute deeply pinnatifid, segments linear rather obtuse entire, the lowest superior one longer obsoletely serrulate, sori sparse, stipes elongated and as well as the rachis glabrous grooved on the upper side and puberulous.” *Bl.*—*Aspidium calcaratum*, *Bl. En. Fil. Jav.* p. 159. *Aspid. Reinwardtianum*, *Kze. Bot. Zeit.* vi. p. 261? *Metten. Aspid.* p. 86? *Aspid. ciliatum*, *Wall. Cat.* n. 351.—Var.  $\beta$ , minutely pubescenti-viscid. *Lastrea viscosa*, *J. Sm. in Hook. Bot. Journ.* iii. p. 412 (name only).

Hab. Java, *Blume, in Herb. Nostr., Thos. Lobb. Moulmein, Thos. Lobb, Parish*, n. 94. Hongkong, *Dr. Dill, Wilford*, n. 40. Nepal, *Wallich*. Assam, *Griffith*. Khasya, *Simons, Hooker fl. and Thomson*. Boutan, *Booth*. Nilghiri, *M'Ivor*. Ceylon, *Gardner*, n. 1107, 1235, 1363.—Var.  $\beta$ . Malacca, *Cuming*, n. 401. Borneo, *Thos. Lobb*.—Having authentic specimens of Blume's plant from himself, I select such specimens from other collectors as I think accord with

them; but as there is considerable diversity in size and form, I cannot be responsible for the accuracy of my conclusions. The caudex is erect, thick and large for the size of the plant, densely rooting, with wiry fibres. Stipites tufted, 4 inches to a foot long. Fronds 5-6 inches to almost a foot in length, blackish-green when dry. Pinnæ more or less deeply pinnatifid; the segments more or less falcate. Perhaps its nearest affinity is *N. falcilobum*, Hook.—Mr. J. Smith's *Lastrea viscosa*, nowhere noticed but by giving it a name, has no marked character or feature by which to distinguish it from the present plant, or two or three of its allies.

58. N. (*Lastrea*) *limbatum*, Desv.; caudex subrepent very irregular copiously rooting scaly, stipes short 3 inches long to the commencement of the dwarfed pinnules slender dark brown at the base the rest as well as the entire rachis bright stramineous glossy, frond more than 3 feet long firm-membranaceous minutely resinoso-punctate beneath long-lanceolate acuminate pinnated, pinnæ opposite sessile 5-6 inches long sessile oblong-lanceolate acuminate with a gland at the base beneath, 6-8 pairs of the lowest pinnæ much dwarfed and lacinated deeply almost to the rachis pinnatifid with oblong obtuse subfalcate segments crenato-dentate at the margin, veinlets 6-8 on each side the costule simple, sori marginal on the teeth of the crenatures at the apex of the veinlet, involucre suboblong-reniform membranaceous blackish-brown at length reflexed.—*Aspidium*, *Sw. Syn. Fil.* p. 50 and 251. *Willd. Sp. Pl.* v. p. 252. *Metten. Aspid.* p. 55. *Lastrea*, *Moore. Amauropelta Breutelii*, *Kze. in Schk. Fil. Suppl.* i. p. 109. t. 51. *Aspidium*, *Mett. Aspid.* p. 85.

Hab. Guadeloupe, *L'Herminier*, in *Herb. Nostr.* St. Kitts, *Breutel*, in *Herb. Nostr.*, from Kunze (not Jamaica, as stated by Mettenius).—I believe a very rare Fern; I possess it only from the two localities already published, namely, from Guadeloupe and St. Kitts. The constantly opposite pinnæ, with a very conspicuous gland at its base beneath, and the position of the sori at the apex of a veinlet, and the peculiar shape of the involucre, are all remarkable in this plant, and induced Kunze to constitute of it a new genus.

59. N. (*Lastrea*) *Sprengelii*, Hook.; "fronds pinnate, pinnæ deeply pinnatifid opposite patent, segments linear-oblong entire pinnatifid lowest ones longer, the basal one beneath of the lower pinnæ subauriculate, involucre hairy the margin glandulose." *Kaulf.*—*Aspidium Sprengelii*, *Kaulf. En. Fil.* p. 239. *Metten. Aspid.* p. 81. *Aspid. glanduliferum*, *Karst. in Linnaea*, xxi. p. 369 (*fide Metten.*). *Aspid. thelypteroides*, *Sieb. Martin*, n. 355 (*fide Kaulf.*).

Hab. Martinique and Porto Rico (*Kaulf.*), Antilles, *Schwanecke*, *Sieber*. Columbia, *Karsten* (*Klotzsch*). St. Vincent, *L. Guilding*, in *Herb. Nostr.*—I am not familiar enough with this plant to pronounce an opinion on it. The author, *Kaulfuss*, does not, in his specific character, allude to the very evident gland, or



"aërophore," which Mettenius notices; nor does my authentic specimen from Schwanecke exhibit it; nor do I find the trace of an involucre. But the gland is very conspicuous in a St. Vincent's plant in my herbarium; yet, in both, several pairs of the lower pinnæ are dwarfed as in *N. conterminum*, a circumstance neither mentioned by Kaulfuss nor by Mettenius.

60. *N. (Lastrea) thelypteroides*, Hook.; "stipes?" (short 3-4 inches long in my specimens), "fronds on both sides pubescenti-hirsute glandulose beneath  $1\frac{1}{4}$  foot long oblong attenuated at both extremities pinnated, pinnæ subopposite patenti-divergent sessile with a conspicuous rounded gland (aërophore) at the base beneath,  $3\frac{1}{2}$  inches long 8 lines wide from a broader subcordate base or truncate above elongato-oblong gradually attenuated acuminate deeply pinnatifid, the lower ones decreasing in size, segments approximate oblong obtuse obliquely patent coadunate into a wing  $1\frac{1}{2}$  line wide, carina from the sinus directed towards the costa, lowest ones largest at the lower base elongated into an auricle overlapping the rachis rarely pinnatifido-crenate, veinlets on each side 6-9 the lowest extending to the margin above the sinus, sori intermediate between the costule and the margin, involucre small reniform ciliated at the margin." *Metten.*—Polypod., *Desv. Sieb. Schlecht. Phegopteris, Fée. Lastrea, Moore. Aspid. thelypteroides, Metten. Aspid. p. 81 (not Sw.).*

Hab. Mauritius, *Sieber, Syn. Fil. n. 50*; lofty mountains of the island, *Bojer, Gardner. Bourbon, Herb. Nostr. from Herb. Mus. Pas.*—This species appears to be peculiar to the two islands just mentioned.

(*Patens-group*, Sp. 61-98, scarcely different from the *Thelypteris-group*, except in the generally more vigorous fronds and larger segments of the pinnatifid pinnæ.)

61. *N. (Lastrea) patens*, Desv.; caudex creeping underground, frond membranaceous or subcoriaceous glabrous pubescent and more or less glandulose beneath, oblong or lanceolato-oblong acuminate pinnated, pinnæ from a truncated broad sessile base linear-oblong finely acuminate 4 inches to a span long patent deeply (two-thirds of the way to the costa) pinnatifid, segments approximate oblong subfalcate at the oblique apex obtusely rounded or shortly acute entire or crenulate, lowest pair generally larger entire crenate or pinnatifid lying parallel with the main rachis, sori copious in the middle between the costule and margin of the segments, involucre cordate-reniform subcoriaceous glabrous or pilose persistent.—*Aspidium, Sw. Syn. Fil. p. 49. Willd. Sp. Pl.*

v. t. 244. *Raddi, Fil. Bras. p. 32. t. 48. Metten. Fil. Hort. Lips. p. 90. Aspid. p. 87.* *Aspidium nymphae, Forst. Prodr. n. 442. Schk. Fil. p. 36. t. 34.* *Lastrea attenuata, J. Sm. in Hook. Bot. Journ. iii. p. 412. Brack. in Fil. U. S. Expl. Exped. p. 193. Aspid. invisum?, Sw. Syn. Fil. p. 48. Willd. Sp. Pl. v. p. 244. Schk. Fil. p. 15. t. 18.* *Aspidium Bergianum, Metten. Aspid. p. 79.* *Polypod., Schlecht. Adumbr. p. 20. t. 9.*

Hab. Tropical America and West India Islands, frequent: Brazil, *Gardner, n. 2989, 5320, 5316?*, *Tweedie* (Salto, South Brazil); Rio, *Milne, etc.*; New Granada, *Linden, n. 1526, 1529, 91, 199, Otto, n. 463*; Jamaica, *Hartweg, n. 1511, March, Wilson*; Guadeloupe, *L'Herminier*; Dominica, *Imray*; Cuba, *Wright, n. 192, 818, 821* (*Aspid. molle, Eat.*); Bahamas, *Herb. Nostr.*; Mexico, *Liebmann*; Peru, *Beechey, Mathews, n. 1248, 1844*; Ecuador, *Jameson, Spruce, n. 5717*; Chili, Guatemala, St. Helena, etc., *Cuming, n. 422, Lefroy.* S. Africa, *Harvey, Zeyher, Burke, etc.* Philippine Islands: Samar, *Cuming, n. 233.* Society Islands: Tahiti, *Brackenridge.* Sandwich Islands: Oahu, *Douglas, Seemann.* Feejee Islands, *Milne, Harvey, Seemann, Cairns, etc.* North America: San Francisco, California, *Sinclair*; Texas, *Lindheimer, n. 742*; Florida, *Chapman*; New Orleans, *T. Drummond, n. 499.*—I do not profess to understand the limits of the present species, the *Aspid. patens* of Sw.; I have therefore been cautious in introducing synonyms, and equally so with the localities, and have only noticed a portion of a large series of specimens, which I yet believe may safely rank here. I have little hesitation in considering the Pacific island *patens* the same as this (of which Forster's plant is well-represented by Schkuhr), as well as the *Lastrea attenuata* of Brackenridge, who has given an excellent figure; but he does not appear to have met with it among the Feejee-group, whence I possess numerous specimens from all visitors.

62. N. (*Lastrea*) *globuliferum*, Hook.; "stipes smooth angled sulcate, fronds glabrous membranaceous pinnated, pinnæ opposite sessile horizontal linear-attenuate pinnatifid on both sides dotted with glands (resinoso-atomiferis) truncate at the base repando-dentate at the apex, segments linear-oblong obtuse toothed at the margin, costa pubescent above, sori small submarginal, involucre reniform hirsute margined with resinous globules."—*Brack. Fil. U. S. Expl. Exp. p. 194.*

Hab. Hawaii, Sandwich Islands, in dense forests, *Brackenridge.*—"This is very distinct from the preceding species (*L. attenuata*, a var. of *N. patens* with us), nor do we know of any one to which it is closely allied." *Brack. l. c.*

63. N. (*Lastrea*) *macrourum*, Hook.; "caudex erect, fronds 2 feet long membranaceous together with the stipes above and the costa sparingly pubescent lanceolato-oblong pinnated, pinnæ sessile 4 inches long linear-lanceolate deeply pinnatifid serrate at the apex, inferior segments rounded at the sinuses distinct from a broad base oblong falcate entire

acute, basal ones longer straight crenated at the base on both sides auricled, sori between the costule and margin of the segments subapproximate, involucre reniform subcoriaceous persistent," *Metten. Fil. Hort. Lips. p.* 90; to which he adds in *Aspid. p.* 87, "caudex epigeous creeping elongate paleaceous, plant varying with subglabrous or densely hirsute fronds, tertiary anticous lowest veins reaching to the callose sinuses of the segments or to a little above the margin of the sinus, carina rather broad or very narrow, involucre subglabrous or long and densely setose."—*Aspidium macrourum*, *Klfs. En. Fil. p.* 239. *Eat. Plant. Fendl. and Wright, p.* 209.—*Mettenius adduces the following synonyms*; *Lastrea*, *Pr.*, *L. Leiboldiana*, *L. grossa*, and *L. Kohautiana*, *Pr. Epim.*, *Aspid. invisum*, *Pæpp. Fl. Cub.*, *Nephrodium compressum*, *Schrad. ?*, *Polypod. subincisum*, *Sieb. Fl. Mart. n.* 354.

Hab. Brazil (*Metten.*), Columbia, *Otto, n.* 434 (*L. Kohautiana, Pr.*), *Seemann, n.* 976. Venezuela, *Fendler, n.* 189, *Moritz, n.* 410 (*Aspid. riparium, Moritz*; this is given by *Moore* as *A. Kaulfussii*). Ocaña, *Schlim, n.* 197 and 220, *Spruce, n.* 5303 and 5304 (rhizome caespitose), *n.* 5371. Peru, *Mathews*. Ecuador, *Spruce*. West Indies: Cuba, *Pæppig* (*Asp. macrourum* of *Kze.*), *Wright, n.* 822 (pinnae  $1\frac{1}{2}$  foot long), *n.* 822 (caudex creeping), and *n.* 1002 (caudex erect); Martinique, *Belanger, n.* 1004? (caudex certainly creeping, rachis and costæ beneath very villous), *Liebm. Fil. Mex. p.* 119 (*Lastrea macroura, Liebm.*).—In so very difficult a group as § *Lastrea* of *Nephrodium*, that to which the present Fern belongs, and of which *N. (Lastrea) patens* may be considered the type, I rely much on the views of Dr. Mettenius, who has the best opportunity of knowing the species of the German botanists. I make use therefore of his specific character here as upon some other occasions, and I shall only further remark, that the individuals I consider belonging to this species scarcely differ from *N. patens*, except in their generally larger and more luxuriant fronds, and more rigid texture.

64. *N. (Lastrea) Kaulfussii*, Hook.; "caudex erect, fronds  $1\frac{1}{2}$ –2 feet long rigidly membranaceous together with the stramineous or violascent stipes pubescent lanceolate or oblong-lanceolate acuminate pinnated, pinnae 2–4 inches long sessile from a truncated base oblong-linear or lanceolate acuminate pinnatifid, segments oblong straight or subfalcate approximate oblique and obtusely rounded at the apex entire or repand, lowest ones larger crenate or inciso-crenate rarely abbreviated, involucre reniform subcoriaceous setosely hairy persistent." *Metten.*—*Aspidium, Link. Sp. Fil. p.* 101. *Metten. Fil. Hort. Lips. p.* 90. *Aspid. p.* 79. *Lastrea, Pr.*

Hab. Brazil (*Metten.*).—My only specimens named *Aspid. Kaulfussii* of any authority, are those from Dr. Klotzsch, collected in Cuba by Otto; but whatever

may be the differences in words between the two plants, I cannot see the shadow of a difference between this and *N. macrourum*.

65. *N. (Lastrea) Serra*, Desv.; caudex creeping and, in one of my specimens from Mr. Spruce, branched and subscandent thick as a man's finger very scaly, stipes  $1\frac{1}{2}$ –2 feet long very stout curved at the base very smooth, fronds 2–4 feet long ovate acuminate broad at the base pale green coriaceous-chartaceous glabrous or subpubescent on the costæ beneath pinnated, pinnæ numerous 6–12–14 inches long  $\frac{1}{2}$  an inch to nearly 1 inch wide subfalcate or flexuose from a sessile subtruncated base linear-oblong elongate acuminate pinnatifid about halfway down with copious very approximate narrow-ovate very acute falcate subserrated segments, veinlets simple lowest pair approximating below the sinus but not uniting, sori copious near the margin and the costule prominent, involucre orbicular reniform persistent subhirsute.—*Aspid.*, *Sw. Syn. Fil. Schk. Fil. p. 35. t. 33 b?* *Willd. Sp. Pl. v. p. 240. Metten. Fil. Hort. Lips. p. 91. Aspid. p. 93. Polypod., Sw. Fl. Ind. Lastrea, Pr.*

Hab. Venezuela, *Moritz*, n. 412 (*Aspid. giganteum*, *Moritz*), *Fendler*, n. 188. New Granada, *Holton*, n. 75. Boqueta, Veraguas, *Seemann*, n. 1552. Ecuador, *Baños*, *Spruce*, n. 5296 (caudex apparently scandent, very thick and scaly), and Chimborazo, elev. 4000 feet, *Spruce*, n. 5296. Cuba, *Wright*, n. 1003, 1004.—This species is perhaps best recognized by its rigid texture and usually brighter green colour, than by any technical characters, many of which are common to all the *patens*-group, and I am in some cases at a loss to decide whether some of my specimens belong to this or to *Kaulfussii* or *macrourum*. One thing is quite certain, that none of the recognized samples at all accord with the figure of *Aspidium Serra* in Schkuhr.

66. *N. (Lastrea) Raddianum*, Hook.; stipes a span to a foot long stout and as well as the stout straight rachis clothed with ferruginous lanceolate scales very woolly at their base, fronds subcoriaceous 1–2 feet long blackish-green when dry, ovato-oblong acuminate pinnatifid at the apex, pinnæ numerous sessile 3–4 inches long 1 inch wide oblong shortly and bluntly acuminate deeply almost to the rachis pinnatifid, the segments oblong-falcate very obtuse entire, lowest pairs of pinnæ deflexed, costa and costules clothed with lanceolate paleaceous scales and bullate cellular ones, veinlets simple each bearing a sorus so near the costule as to be partially covered with the scales, involucre small reniform. (TAB. CCXLV.)—*Aspidium*, *Metten. Aspid. p. 91. Polypodium vestitum*, *Raddi, Fil. Bras. p. 24. t. 36. P. deflexum*, *Kaulf. En. p. 114. P. lepigerum*, *Martius, in Herb. Nostr.*

Hab. Brazil, about Rio, *Douglas, Martius, "Pohl," Milne and McGillivray*.—This species is well distinguished by its peculiar clothing: the stout stipes and rachis are shaggy with woolly scales, the costæ and costules have the appearance of being infested by some kind of scale-insect, so copious and conspicuous are the scales there. The species is well named, by Martius, *lepigerum*.

67. *N. (Lastrea) Caripense*, Hook.; "caudex erect, stipes paleaceous above (together with the frond on both sides) paleaceo-pilose, frond 2 feet long membranaceous pubescent at the margin oblong acuminate pinnate, pinnæ petiolate 3–4 inches long from a truncated base oblongo-linear acuminate deeply almost to the base pinnatifid, segments approximate oblong obtusely rounded entire, lowest ones narrowed at the base and sessile, sori between the costule and the margin, involucre membranaceous hairy at the margin deciduous before the maturity of the capsule." *Metten.*—*Aspidium, Metten. Fil. Hort. Bot. Lips. p. 90. Aspid. p. 90. Polypodium, H. B. K. in Willd. Sp. Pl. v. p. 202. Polypodium submarginale, Langsd. et Fisch. Fil. p. 12. t. 13. P. distans, Kaulf. En. Fil. p. 113.*

Hab. Carape, Venezuela, *Humboldt and Bonpland*. Tovar, *Fendler, n. 371*. Brazil, *Langsdorff*.—Langsdorff and Fischer's figure well represents the general character of this Fern. My specimens are from Fendler.

68. *N. (Lastrea) lonchodes*, Hook.; caudex creeping elongated as thick as a goose-quill scarcely chaffy, stipes brownish a foot long glabrous or pubescent above, frond subcoriaceous rigid 1–1½ foot long pubescenti-hirsute at the costa and costule the rest glabrous lanceolate pinnate, the apex long acuminate pinnatifid, pinnæ 12–18 pairs smaller towards each extremity, lowest ones not deflexed oblong or oblongo-lanceolate crenate or pinnatifid, the apex entire acuminate, segments short falcate obtuse, veinlets 5–8 in each segment the two lowest connivent (but not conjoined), keel prominent from the sinus nearly to the costule, sori between the margin and the costule of the segments."—*Aspidium, Eat. Fil. Wright. et Fendl. p. 210.*

Hab. Cuba, near Monte Verde, *Wright, n. 1007, 1008*.—A Fern of rigid texture, and, in that respect, resembling *N. deltoideum*; but, as Mr. Eaton remarks, the pinnæ are not suddenly dwarfed towards the base of the frond. One of my specimens of n. 1007 has the lowest pairs of segments dilated at the base into two auricles, so as to give the pinna a hastate form, with blunt lobes. No. 1008 has very much the habit of *N. (Eunephrodium) molle*, but I do not find any of the veinlets truly conjoined.

69. *N. (Lastrea) diplazioides*, Hook.; "caudex erect, stipes 3–4 inches long subsquamosely paleaceous, frond

membranaceous deep green slightly hairy 2-3 feet long lanceolate pinnated, pinnæ numerous subrectangularly patent sessile with a large distinct squamiform adpressed gland (aërophore) at its base becoming shorter at each extremity the middle ones 6 inches long 10 lines wide from the inferior rounded base truncated above elongate oblongo-lanceolate acuminate pinnatifid repand at the apex, superior ones approximate, inferior ones remote and suddenly smaller, lowest ones triangular-ovate dwarfed, segments united by a wing  $2\frac{1}{2}$  lines wide approximate separated by an acute sinus oblong obtuse plane entire or towards the apex repando-crenulate, veinlets eight on each side the costule, lowest ones prolonged above the margin of the sinus equally curved and the nearest (proximi) or all soriferous, sori oblong nearer the costules than the margin, capsules few loosely clustered, involucre reniform membranaceous setose at length contracted persistent."—*Aspidium*, Moritz, in Metten. *Aspid.* p. 83. *Eat. Fil. Fendl. et Wright.* p. 209.

Hab. Columbia, Tovar, Moritz, n. 408, Fendler, n. 149.—"Differt ab antecedente (*N. pachyrachis*) ala laciniarum lata, soris oblongis indusiis tenuissimis margine setosis, non glandulosis;" very slight distinctions, but to which may be added the paleaceous stipes and rachis, which is perhaps at best a fugacious character.

70. *N. (Lastrea) pachyrachis*, Hook.; "stipes hairy above, frond subcoriaceous 2-3 feet long at length nearly glabrous lanceolate pinnated, pinnæ alternate sessile with a squamiform conspicuous gland (aërophore) at the inferior base  $4\frac{1}{2}$  inches long 7 lines wide in the middle gradually shorter towards each extremity from a broad truncated base elongato-oblong gradually attenuated deeply pinnatifid entire at the apex, the segments united by a wing  $1\frac{1}{2}$  line wide approximate oblong obtuse entire the margin at length revolute, veinlets immersed on each side 8-12 lowest ones extending to the sinus of the margin somewhat equally curved, sori near the costule subapproximate, involucre reniform conspicuous somewhat rigid glandulose."—*Aspidium*, Kze. in Metten. *Aspid.* p. 83. *Eaton, in Fil. Fendl. et Wright.* p. 209.

Hab. Venezuela: Merida, Moritz, n. 409. Tovar, Fendler, n. 472.—I possess a noble frond of this Fern from Mr. C. Wright, named by Mr. Eaton; it is 3 feet long, exclusive of the stipes; many of the pinnæ are 6 inches long, and many are opposite, and the base of the frond is much attenuated below, in consequence of the gradual reduction of several of the lowest pairs of pinnæ. It possesses, however, no very striking characteristic mark, except it be in the "pinnæ infra insertionem aërophoro manifesto squamæformi instructæ," which is not indeed very manifest in my specimen; perhaps because, in the dried and pressed state,

the broad flattened rachis overlaps it; nor do I find the pinnæ to be broadest in the middle, but at the base.

71. *N. (Lastrea) aureo-vestitum*, Hook.; caudex short apparently erect densely clothed with dark golden-brown silky subulate flexuose scales  $\frac{3}{4}$  of an inch long, stipes 4 inches to a span long clothed at the base with the same long satiny scales as the caudex, the rest of it and all the rachides are shaggy with shorter copious flexuose aureo-nitent subulate scales, while the costæ beneath are clothed with rather small ovate bullate appressed scales, fronds  $1\frac{1}{2}$ -2 feet long ovato-lanceolate membranaceous acuminate and deeply pinnatifid at the apex the rest pinnate, pinnæ sessile 4-5 inches long oblong gradually acuminate deeply very nearly to the costa pinnatifid with acute sinuses, segments  $\frac{1}{2}$  an inch long oblong obtuse rarely subfalcate entire or crenate or in age rather strongly serrated, veinlets oblique somewhat distant 7-8 on each side the costule simple bearing a sorus on each veinlet between the margin and the costule, involucre? (probably quickly deciduous). (TAB. CCXLVI.)

Hab. "Mt. Leban, St. Yago de Cuba, 1844. *Linden*, n. 1901." Jamaica, *Wilson*.—At different periods I received from Mr. Linden two different Ferns under n. 1901; one, the species following this, well described by Mettenius, under the name of *Aspidium velatum*, and with the ticket there recorded; the other with the inscription here copied: the two are totally different, as the specific characters and figures will show. *N. velatum* I have seen from no one else; of the present I possess a larger and more fully developed specimen from Jamaica (*Wilson*), with pinnæ and segments twice as large, and many of them strongly serrated, but unfortunately without fructification.

72. *N. (Lastrea) velatum*, Hook.; caudex "oblique," stipes 3-4 inches long and as well as the subflexuose rachis shaggy with rather membranaceous very cellular ovate lax finely acuminate and often fimbriated tawny scales passing on the under side of the costæ into smaller bullate often obtuse ones, fronds 1-2 feet long oblong-lanceolate membranaceous when young especially minutely and pellucidly glandulose pinnate deeply pinnatifid at the apex, pinnæ rather distant especially the lower pairs spreading 2-3 inches long little more than  $\frac{1}{3}$  of an inch wide from a broad base linear-oblong obtuse deeply pinnatifid almost to the costa, segments oval-oblong obtuse slightly falcate often opposite crenate, the two basal ones larger than the rest close to and parallel with the rachis resembling two ears or wings and affording a striking character, veinlets 4-5 on each side the costule 3-4 of the upper ones in general only bearing sori at their apices and



consequently quite marginal, involucre orbicular-reniform brown permanent. (TAB. CCXLVII.)—*Aspidium*, Kze. in *Metten. Aspid. p. 79*.

Hab. "Cuba, 1843-4, *Linden*, n. 1901."—A very distinct and well-marked species, in its ample scaly clothing somewhat resembling *N. Raddianum*; but in other respects very different, especially in the nature of the scales, which in *Raddianum* give an untidy look to the plant, as if injured by parasitic insects.

73. *N. (Lastrea) pilosulum*, Hook.; "caudex erect, fronds 2 feet long membranaceous and together with the stipes soft villosopilose lanceolate pinnated, pinnæ shortly petiolate 2-3 inches long from a truncated base linear-lanceolate acuminate pinnatifid, segments oblong straight or subfalcate obtuse entire or repandly crenate, the basal ones generally larger, sori large near the margin of the segments, involucre conspicuous roundish reniform membranaceous ciliated at the margin at length deciduous." *Metten.*—*Aspidium*, *Kl. et Karst. ex Kunze Linnæa*, xxiii. p. 229. *Metten. Fil. Hort. Lips.* p. 130 (*Addend.*). *Aspid. p. 78*. *Eat. Fil. Wright et Fendler*, p. 209. *Lastrea*, *Moore. Aspid. lasiesthes*, Kze. in *Linnæa*, xxiii. p. 300. *Metten. Fil. Hort. Lips.* p. 90. *Polypod. molliculum*, Kze. in *Linnæa*, xxv. p. 749.

Hab. Columbia, "*Moritz*, n. 114, and Venezuela, *Wagener*," *Fendler*, n. 178, β.—My only specimen of this is from *Fendler* (not 178, which is *N. conterminum*), and the only allusion I can find to its affinity is in *Mettenius*, "*Trunco erecto congruit cum A. oligocarpis, sori majoribus indusioque manifeste diversum.*" Is it really distinct from *A. patens*?

74. *N. (Lastrea) Kunzeanum*, Hook.; "frond broad-lanceolate truncated at the base pinnated, pinnæ sessile linear-lanceolate acuminate pinnatifid with the margined rachis and elevated veins hairy beneath, segments lanceolate falcate acute repando-marginate ciliated, lowest ones dwarfed (deorsum subdeficientibus) pellucid at the sinuses, rachis and stipes tetragonous pubescent, sori submarginal, involucre hairy."—*Aspidium*, Kze. in *Linnæa*, ix. p. 93. *Metten. Aspid. p. 93. Lastrea, Pr.*

Hab. Pampayaca, Peru, *Poeppig*.—Neither the specific character, nor my authentic specimen from Kunze, seems to offer any difference from my equally authentic specimens of *N. macrocarpum*.

75. *N. (Lastrea) falciculatum*, Desv.; caudex stout erect thickly clothed with subulate scales, stipites a span long deciduously scaly, rachis slender ferrugineo-pubescent, frond from a broad base ovato-oblong 12-14 inches long membranaceous flaccid pubescenti-glandulose viscid especially be-

neath pinnated deeply pinnatifid at the apex, pinnæ approximate lowest pair remote 4 inches long subsessile oblong acuminate deeply pinnatifid (very nearly to the costa), segments oblong obtuse crenato-serrate, veinlets simple bearing a dorsal sorus between the margin and the costule, involucre small reniform.—*Nephrodium*, *Desv. Mém. Soc. Linn.* vi. p. 241. *Lastrea*, *Pr.* *Aspidium*, *Raddi, Fil. Brasil.* p. 31. t. 47. *Lastrea squamosa*, *Kl. in Herb. Nostr. and Aspid. chrysolum*, *Link?* *Metten. Aspid.* p. 90? *Lastrea mucronata*, *Pr. and Kl. in Herb. Nostr.*

Hab. Brazil, Rio, *Raddi*, *Douglas*, *Sellow*, *Milne*, *McGillivray*, *Gardner*, etc. Mexico, *Galleotti*, n. 6290.—I cannot quite satisfy myself of the presence of an involucre in this Fern. The fronds are flaccid and membranaceous, and beneath, especially, viscid and glanduloso-pubescent; the segments are long, crenato-serrate; the sinuses extending very nearly to the costa.

76. N. (*Lastrea*) *tetragonum*, *Hook.*; "stipes a foot long puberulous with minute stellated hairs, frond membranaceous above (the costæ excepted) glabrous below puberulous with very minute stellated hairs  $1\frac{1}{4}$  foot long oblong acuminate pinnated, pinnæ 10–15 pairs obliquely patent subopposite  $6\frac{1}{2}$  inches long 1 inch broad petiolate broad-lanceolate acuminate pinnatifid attenuated at both extremities, segments approximate confluent into a wing 2–3 lines broad oblong obtuse tapering from the middle towards each extremity, lower ones abbreviated, basal ones very much dwarfed or obliterated, tertiary veins curved twelve on each side (the costule), the lowest anterior ones as well as the posterior ones proceeding from the costa and those adjacent connivent at the sinus of the segments, sori nearer the costules than the margin." *Metten.*—"Lastrea tetragona, *Pr. Tent. Pterid.* p. 76?" *Aspidium*, *Metten. Aspid.* p. 95. "*Aspidium setosum*, *Kl. in Linnæa*, xx. p. 371."

Hab. Tropical America: "Paramaiba, *Keppler*; New Granada, *Funk*, n. 450;" *Tovar*, *Moritz*, *Aspid. setosum*, *Kl.*, consequently authority for *Mettenius's* plant; and with this agree specimens from Venezuela, *Fendler*, n. 446, n. 193 and 193 γ; St. Vincent, *L. Guilding*; Berbice, *Schomburgk*; Brazil, *Gardner*, n. 16 and 190? Esmeraldas, *Jameson*, but most of the upper pinnæ exactly opposite; and Guadeloupe, *L'Herminier*, n. 22? (bordering more closely on *N. falcilobum*).—This is comparatively a new species. Dr. *Mettenius* adopts the name from *Presl*, but with a mark of doubt. It must not be confounded with *Polypodium tetragonum*, though has considerable general resemblance to the plant so called. I fear it is a very variable species.

77. N. (*Lastrea*) *deltoideum*, *Desv.*; caudex stout erect or ascending densely paleaceous above with dark brown su-

bulate scales copiously rooting at the base, stipites tufted generally short 2–3 inches and sometimes a span long copiously paleaceous with lanceolate acuminate at length deciduous scales, fronds  $1\frac{1}{2}$ –2 feet and more long coriaceous upper half or more ovate acuminate lower portion (or one-half) suddenly contracted into an elongated linear outline pinnated pinnatifid at the apex, the larger pinnæ 3–4 inches long 1 inch broad sessile truncated at the base oblong (the sides nearly parallel) shortly and rather obtusely acuminate pinnatifid rather more than halfway down the rachis, segments oblong-ovate obliquely subacute scarcely arcuate entire, veinlets prominent on the under side 8–10 on each side the costule the lowest opposite pairs closely approximating near the sinus but not conjoined, lower pinnæ sometimes 13–14 pairs nearly uniformly and very suddenly dwarfed and sub-semihastate having a large auricle at the superior base, sori copious nearer the margin of the segments than the costule, involucre soon deciduous.—*Pr. Tent. Pterid. p.* 81. *Aspidium, Sw. Syn. Fil. p.* 49. *Willd. Sp. Pl. v. p.* 238. *Metten. Aspid. p.* 93. *Polypod., Sw. Fl. Ind. Occ. Lastrea, Moore.*

Hab. West Indies, probably in most of the islands: Jamaica, *Wilson, March, etc.*; Guadeloupe, *L'Herminier*; Cuba, *Wright, n.* 823; Porto Rico, *Schwanecke*.—One of the most easily recognized of Ferns. At first sight it might be taken for a *Eunephrodium*.

78. *N. (Lastrea) triste*, Hook.; "frond short-ovate coriaceous pinnate, pinnæ sessile lower ones subopposite long and cuneato-attenuated at the base terminal one petiolated all broadly lanceolate acuminate incisopinnatifid (destitute of gland at the inferior base), segments falcato-oblong obtuse sinuato-denticulate subglabrous above hairy beneath on the costæ veins and veinlets and on the subreflexed margin, rachis and long stipes tetragonous scabro-hirsutulous, sori uniseriate." *Kze.*—*Polypodium triste, Kze. in Linnæa, v.* 9. *p.* 47. *Aspidium, Metten. Aspid. p.* 94. *Nephrodium molle, Liebm. in Herb. Nostr.; an Fil. Mex.?*

Hab. Peru: Huallaga, *Poeppig, in Herb. Nostr.*; Tarapota, Eastern Peru, *Spruce, n.* 4037, 4066, 4091, 4343, 4748, Tanguranguas, Andes of Ecuador, *Spruce, n.* 5298 (indusium purpurato-punctatum) and 5608. Mexico: Calipa, *Liebm.* New Granada, *Holton, n.* 43. Surinam, *Hostmann, n.* 466.—I have little doubt of all the specimens from the above localities being identical with Kunze's plant from Poeppig. It is perhaps a common tropical South American species, and may rank near to *N. (Lastrea) tetragona* (our *n.* 76), chiefly distinguished by its larger size, more deeply pinnatifid pinnæ, and their much attenuated base. Kunze compares

it with *Polypod. tetragonum*, which has considerable affinity with it, but differs in the venation and absence of involucre, etc. All my specimens are of a peculiarly dark-green colour, paler beneath.

79. N. (*Lastrea*) *resinoso-fetidum*, Hook.; caudex?, stipes  $1\frac{1}{2}$ -2 feet long very stout angled when dry, glabrous (as is the rachis) slightly scaly near the base, frond 3-4 feet long coriaceous broad-oblong acuminate attenuated below in consequence of the dwarfing of several of the distant inferior pinnæ pinnate, pinnæ numerous 6-12 inches long 1 inch wide from a broad sessile base which has a brown fleshy gland beneath elongato-oblong or sublanceolate acuminate three-quarters of the way down to the rachis pinnatifid, segments linear-oblong but gradually acuminate from the base, the margins entire at length reflexed, veinlets all simple slender dark-coloured (hence conspicuous), sori copious submarginal, involucre when young large membranaceous cordato-suborbicular persistent, the disk dark-coloured where the attachment to the receptacle takes place.

Hab. Foot of Chimborazo, alt. 3000-4000 feet, *n.* 5300, in moist woods, *Spruce*, *n.* 5299, 5300, 5301, 5302 ("Filix odore resinoso-fetido").—The presence of a very conspicuous gland at the inner base of the pinnæ, and the narrow segments of the latter, with some minor characters, such as the contraction of the lower pinnæ, are all I have to offer as the specific distinctions of this fine Fern. Mr. *Spruce* observes, when recent, that it had a peculiarly "fetid resinous smell."

80. N. (*Lastrea*) *piloso-hispidum*, Hook.; caudex?, stipes?, frond 4 feet long ovate-oblong firm but not very thick coriaceous subvernicate hispid with short white spreading hairs on both sides longer and more copious on the rachis costæ veins and veinlets, pinnate, pinnæ very numerous crowded less so towards the base from 6 inches to 1 foot long and  $1-1\frac{1}{2}$  inch wide having a black transverse gland at the base beneath, from a truncate or rounded base (the two lowest pairs of segments being often a little shorter than the rest) broad-oblong acuminate deeply to within a short distance from the costa pinnatifid, segments approximate oblong or linear-oblong straight scarcely subfalcate the margins entire and in age slightly reflexed, veinlets numerous simple bearing the small sori towards the apex consequently forming a marginal series upon the segments, capsules few lax, involucre minute hispid very deciduous.

Hab. Foot of Chimborazo, alt. 3000 feet, *Spruce* (without number).—Tropical Western America seems to abound in very large fronded forms, with broad pinnæ, of a group which may be said to belong to the *patens*-section of our *Nephrodium*; but of which, however different from *N. patens*, it is very difficult to define their

specific limits. The present is allied to the *N. triste*, but has a distinct gland, though not a prominent one, at the base of the pinnæ beneath, and none of these pinnæ taper into a petiole below. The surface of the frond is glossy, as if varnished on both sides; the sori are very small; and the involucres so minute, that I feel doubtful whether they really exist. If absent, this Fern would belong to the *Phegopteris*-group of *Polypodium*. The hispidopilose frond, stipes, rachis and veins are remarkable.

81. *N. (Lastrea) Leprieurii*, Hook.; caudex?, stipes two feet or more long stout without scales glabrous, frond  $1\frac{1}{2}$ –2 feet long from a broad truncated base ovate-oblong acuminate coriaceous-membranaceous glabrous but more or less hairy or pubescent on the rachis upwards and on the costæ and veins beneath pinnate, pinnæ 4–6 inches long  $1\frac{1}{4}$  inch wide from a broad truncated base having a conspicuous elongated tongue-shaped gland beneath broad-oblong rather suddenly acuminate deeply for three-quarters of the way down to the rachis pinnatifid, segments approximate broad-oblong obtuse entire or subdentate at the apex, veins all simple bearing the sori in the middle forming lines upon the segment equidistant between the margin and the costa, involucres (most perfect in the Tarapota specimen) exactly reniform very conspicuous convex pubescent and more or less villous.—Var.  $\alpha$ , subglabrous, gland much elongated.—Var.  $\beta$ , more coriaceous subciliated more hirsute on the costæ and veins beneath.

Hab. Tropical America: var.  $\alpha$ , marshy woods of central French Guiana, *Le Priour*; var.  $\beta$ , Mount Campana, Tarapota, Eastern Peru, *Spruce*, n. 4660.—Whether I am correct in uniting the two plants, respectively from Eastern Peru and from Cayenne, I must leave others to judge, or whether I am correct in considering the species itself distinct. Of large species of Ferns it is seldom that a good suite of specimens is collected, to enable one to judge how far there may or may not be intermediate forms, or of the value of what we may consider specific marks. Our var.  $\beta$  is much more coriaceous than  $\alpha$ , and more hairy or hispid: there is a slightly elevated line on the under side, passing downward from the base of the sinuses towards the costa, with quite the appearance of a costule, but it is rather a line of union to the base of the segment with its neighbour, as if there had been a separation, and has no corresponding line on the upper side.

82. *N. (Lastrea) microsorum*, Hook.; caudex?, stipes  $1\frac{1}{2}$  foot long rather stout angulato-striate when dry at the base rather thickly paleaceous with reflexed subulate soft scales the rest and the rachis (pubescent in the upper half) somewhat sparingly setoso-paleaceous, frond submembranaceous  $2\frac{1}{2}$  feet or more long oblong-ovate acuminate (the apex, imperfect) pinnate, pinnæ rather distant sessile or nearly so with no gland at the base beneath, 4–6–8 inches long  $1\frac{3}{4}$  inch broad in the broadest part from a slightly contracted and

rounded base broad-oblong acuminate very deeply pinnatifid quite to the rachis pinnate in the lower half, pinnæ and segments close-placed oblong subfalcate obtuse and subangulato-dentate at the apex, the rest of the margin entire, veinlets rather obscure forked, sori small distant cinnamon-coloured always on the superior branch of the fork and halfway between the slightly pubescent costule and the margin, involucre minute but apparently persistent reniformi-rotundate.

Hab. At the foot of Chimborazo, Ecuador, *Spruce (without number)*.—This is probably a rare plant. I cannot refer it to any described *Nephrodium*, and am inclined to consider it a distinct species. The frond is of rather a bright-green colour; the pinnæ are not attenuated at the base; but two or three of the lowest pairs of pinnules or segments are shorter than the rest, so as to give a rounded and not truncated form to the base. The broader pinnules or segments are thus nearly in the middle. All the segments (except at the apex) are cut very deeply down to the very rachis, and the inferior ones are clearly distinct, so that the frond is in that part of it bipinnate; but the pinnules and segments are both equally approximate.

83. *N. (Lastrea) schizotis*, Hook.; caudex?, stipes long stout  $\frac{1}{2}$  of an inch broad near the base and there only sparsely and deciduously scaly glabrous, rachis and costæ on both sides pubescenti-hirsute, frond 3–4 feet or more long ovato-oblong acuminate coriaceous-membranaceous pinnate, pinnæ spreading from 6 inches to a foot long sessile (with no gland beneath) from a broad base elongato-oblong much and long-acuminate pinnatifid three-quarters of the way down to the costa with very numerous lanceolate subfalcate acute entire segments, the basal ones above and below especially those of the lower half of the fronds much the largest forming large auricles parallel with and close to the rachis laciniato-pinnatifid, veinlets simple 10–12 on each side of the costules bearing prominent sori forming two series on the segments from the rachis nearly to the apex, involucre small rotundato-reniform canescently hairy.

Hab. Near Tarapota, Eastern Peru, *Spruce, n. 4030*.—My single specimen of this has the frond 4 feet long, and 2 feet wide in the broadest part; and but for its great size, and the large and laciniato-pinnatifid auricles or basal segments, I might have been disposed to have referred it to *N. patens*. It is however, I think, quite distinct.

84. *N. (Lastrea) Tarapotense*, Hook.; caudex?, stipes  $1\frac{1}{2}$  foot and more long moderately stout angled when dry, at the dilated base densely clothed with brown linear-subulate rather long crisped scales less copious and smaller higher up

and on the rachis, frond 2-3 feet long oblongo-ovate acuminate glabrous or nearly so firm-membranaceous full-green pinnate, pinnæ spreading sessile or subsessile 4-6 inches long scarcely an inch broad from a nearly truncate base (destitute of gland) oblong-lanceolate finely acuminate deeply pinnatifid about two-thirds of the way to the costa (which has a few appressed small lanceolate scales), segments broad-oblong obtuse subfalcate entire or very obscurely subdentate, sinuses very narrow, veinlets all simple 8-10 on each side the costule, sori copious on the back of the veinlets rather nearer the margin than the costule, involucre "very small reniformi-orbicular soon deciduous" (*Spruce*).

Hab. Near Tarapota, Eastern Peru, *Spruce*, n. 4016; and Montana de Canelos, near Rio Verde, foot of Chimborazo.—This, again, is one of many South American lastreoid *Nephrodia*, which presents no very striking feature or distinguishing specific character, and yet I cannot refer it safely to any described species. In habit it partakes of *N. patens* and *N. triste*, nearer perhaps to the last, but is much more paleaceous with very narrow scales, and the pinnæ are not so much attenuated at the base.

85. *N. (Lastrea) falcilobum*, Hook.; caudex short thick tufted copiously rooting, stipites tufted a span to a foot long free from scales, fronds 1-1½ foot long firm rigid coriaceo-membranaceous ovato-lanceolate finely acuminate pinnate, pinnæ 4-6 inches long numerous rather distant sessile linear-lanceolate deeply nearly down to the costa pinnatifid, the apex coarsely serrated, segments oblong-linear more or less falcate acute the margin in fertile specimens generally revolute when dry that of the superior base longer than the rest, involucre small glabrous.—*Lastrea*, *Hook. in Kew Gard. Misc.* ix. p. 338. *Benth. Fl. Hongkong.* p. 455.—Var.  $\beta$ , pinnæ small 2-3 inches long tapering at both ends and only pinnatifid halfway down in the middle.

Hab. Hongkong, *Harland, Bowring*. Various parts of continental India, especially eastern Bengal to Sikkim, *Griffith, Hooker fl. and Thomson*; Nilgiri, *Beddome*; Ceylon, *Gardner*, n. 1363, *Thwaites*, n. 3273; Moulinein, *Parish* (some of the smaller specimens, I fear, passing into *N. calcaratum*). Feejee Islands, *Milne* (larger, pinnæ 8 inches long, tapering at the base into a winged petiole).—Var.  $\beta$ , Ceylon, *Thwaites*, n. 3050. Malay Islands, *Thos. Lobb*.—It is not willingly that I retain this as a species, but because I do not know where else to refer some of the specimens I have brought hither. Mr. Bentham very justly, I. c., throws doubts on the species, and observes, "very near the *N. gracilescens*," which he refers to the European *N. Thelypteris*, but that is remarkable for a long creeping root. I am more disposed to consider this a large form of *N. calcaratum*, while some specimens I can almost imagine passing into the *Lastrea attenuata*, Brack., and thus scarcely differing from *N. patens*.—Var.  $\beta$  at first sight looks very distinct, but I believe it to be only one of the protean forms, I will not say of this species, but of this group.



86. N. (*Lastrea*) *appendiculatum*, Hook. ; "frond membranaceous setose at the costæ the rest pubescenti-pilose  $2\frac{1}{2}$  feet long pinnate, pinnæ subapproximate patent sessile with a small gland at the base beneath, from the middle gradually diminishing towards each extremity, the middle ones  $3\frac{1}{2}$  inches long 7 lines wide elongato-oblong gradually attenuated caudato-acuminate deeply pinnatifid the apex entire, segments approximate with narrow sinuses linear-oblong obtuse the basal ones equal to those next to them or especially upon the lowest pinnæ with the lowest enlarged ones, tertiary veins 10-14 on each side the lowest ones reaching the margin above the sinus, involucre?, capsules with a simple hooked seta." *Metten.*—*Aspidium*, *Wall. Cat. n. 249. Metten. Aspid. p. 81* (who quotes "*Lastrea*, *Pr. Tent. Pterid. p. 75?*").

Hab. Nepal, *Wallich*.—Moore gives three Ferns of Wallich, under the name of *Aspid. appendiculatum*; one he refers to *Lastrea appendiculata*, he does not say of whom, another to *Polypodium erubescens*, and the third to *Nephrod. molle*. As far as I know, Mettenius is the only author who has described Wallich's plant from Nepal; but my specimen of Wallich thus localized does not agree in size with Mettenius's description, for the pinnæ are 10-11 inches long and  $1\frac{1}{4}$  inch broad; but the Fern affords so little of a tangible character, that any remarks I make will not clear up the difficulty about the species. I have other specimens, places may be the same as those so named, but on no good authority. Mettenius which it next before *N. ochthodes*.

87. N. (*Lastrea*) *ochthodes*, Hook. ; "rhizome short, stipites crowded moderately long flexuose fusco-paleaceous towards the base, frond subcoriaceous firm, on both sides at the costules on the veins beneath and at the margin sparingly canescently hispidulous olivaceous above paler beneath, lanceolate acuminate at the base gradually and long attenuated pinnate, pinnæ deeply pinnatifid sessile with a callous gland at the base beneath patent or divergenti-patent from a broad subequal base linear-attenuated compound the lower ones gradually abbreviated and dwarfed the lowest abortive, segments falcato-oblong or linear rather acute margin reflexed subrepand the lowest ones on each side longer distinctly but slenderly pinnately veined lowest pair confluent at the pellucid sinus bearing sori at the apex, sori minute extended to the margin and continued to the apex soon contiguous the series united at the base, involucre minute reniform brown hairy, rachis obtusely angular furrowed above hispidulous." *Kze.*—Var. *α*, frond much attenuated at the base by the dwarfing of the pinnæ. *Aspidium ochthodes*, *Kze. in Linnæa*, xxiv. p. 282. *Metten. Aspid. p. 82.*—Var. *β*,

the lowest pinnæ (several pairs) suddenly abortive reduced to large tuberculated glands. *Aspid. tylodes*, *Kze. in Linnæa*, xxiv. p. 281. *Metten. Aspid.* p. 82, "*vir ab Aspid. ochthode diversum videtur.*" *Aspid. glanduliferum*, *Wall. Cat.* n. 347.

Hab. A common Fern in most parts of India, particularly in Nilghiri, *Wight*, n. 157, 128: in Assam, *Khasya*, *Beddome*, n. 123; Bootan, *Griffith*, etc.; Darjeeling, *Hooker fil. and Thomson*; Nepal, *Wallich*, n. 347: Ceylon, *Mrs. Genl. Walker (small var.)*. Mauritius, *Bojer*.—A very variable plant, it must be confessed, long found in our collections under the name of *A. glanduliferum*, *Wall.*, best known by the very distinct gland generally seen at the inner base of the pinnæ, and the dwarfing of several of the lower pairs of pinnæ (as in the *N. conterminum* of South America), so that the frond is in such case very much attenuated below; or, the pinnules become suddenly and completely abortive, their place being taken by large tuberculiform glands; or the two kinds are seen on the same tuft. I apprehend the former is the *A. ochthodes* of Kunze, and the second his *A. tylodes*; but they are clearly one and the same species.

88. *N. (Lastrea) melanopus*, *Hook.*; caudex?, stipes a little scaly below a span or more long rather slender and as well as the rachis glossy ebeneous-black, fronds 12–14 inches long membranaceous bright-green obsoletely subglandular-pubescent especially on the costæ pinnate, pinnæ subopposite sessile 4–6 inches long 1–1½ inch wide oblong shortly acuminate pinnatifid, segments oblong obtuse rarely subfalcate entire or nearly so, lowest pair of pinnæ semiovate subfalcate the inferior half of the pinnæ with much longer segments 1–1¼ inch long lobato-pinnatifid, veinlets forked distant, sori small on the superior branch of the veins equidistant between the margin and the costule, involucre small membranaceous reniform ciliated.

Hab. Moulmein, *Parish*. Amboyna, *ex Herb. Webb, in Herb. Nostr.*—My most perfect specimens of this plant are from the Rev. C. S. P. Parish, in which, besides the intense ebony-black of the stipes and main rachis, the lowest pairs of pinnules differ considerably from all the rest, as above described. Although I have no specimens with a caudex, one of the clever sketches of a growing plant sent me by the discoverer clearly shows that it is short, erect, and scaly, and that the stipites are tufted: against the whole of the lower part of the stipes, including the caudex, is marked "*all black.*" In general habit it may rank near *N. immersum*. The Amboyna specimen is a larger plant, yet not, I think, specifically different; but it wants the lower pinnæ.

89. *N. (Lastrea) crinitum*, *Desv.*; stipes a span and more long fusco-stramineous and as well as rachis very crinite with long spreading dark-brown subulato-setaceous scales arising from a tubercle, fronds subcoriaceo-membranaceous a span to 18 inches long ovate or oblong-ovate acuminate pinnate, pinnæ approximate 3–5 inches long often an inch and more

broad lowest one or two pairs deflexed and subpetiolate opposite or subopposite sessile oblong-lanceolate more or less acuminate deeply pinnatifid, segments oblong obtuse straight or subfalcate entire or the lowest ones crenate subpinnatifid at their base, costæ beneath pubescent and more or less scaly and subcrinite, veinlets numerous simple each bearing a sorus near the middle, involucre small reniform membranaceous soon deciduous.—Polypodium, *Poiret, in Enc. Bot. Hook. et Grev. Ic. Fil. t. 66.* Aspidium, *Wall. Cat. n. 357.* Polypod. fusco-setaceum, *Bojer, in Herb. Nostr.* Aspidium strigosum, *Willd. Sp. Pl. v. p. 249.* Metten. *Aspid. p. 89.* Aspid. pauciflorum, *Klf. in Sieb. Syn. n. 44, and Fl. Mixt. n. 312.* Metten. *Aspid. p. 88.* Aspid. nitidum, *Bory, in Willd. Sp. Pl. v. p. 251, and in Herb. Nostr.* Aspid. sulcatum, *Klf. in Sieb. Fl. Mixt. n. 288, and Syn. Fil. p. 46.* Metten. *Aspid. p. 89.*

Hab. Mauritius, abundant. Bourbon, *in Herb. Nostr. ex Herb. Mus. Paris.* Java, *Blume, in Herb. Nostr.* (marked "*Aspid. setosum*"), *Millet, Thos. Lobb.*—This plant varies much in size, and a good deal in the relative breadth of the lobes, but perfect specimens are easily recognized; in an old state, the involucre and the remarkably crinite scales are equally deciduous.—Dr. Blume's "*Aspid. setosum*" in my herbarium from Java, though an indifferent specimen, seems quite the same as *crinitum* from Mauritius.

90. N. (Lastrea) *Borneense*, Hook.; caudex procumbent crinite with scattered subulate long scales and hair-like setæ, stipes 4–5 inches long terete as well as the rachis, frond oblong-ovate 1–1½ foot long subcoriaceous-membranaceous acuminate glabrous pinnate pinnatifid at the apex, pinnæ 3–4 inches long subopposite lanceolate acuminate straight or subfalcate lower ones petiolate (the petiole winged) the rest sessile and subdecurrent so that the rachis is winged in the upper part of the frond deeply pinnatifid, lobes oblong acute pinnatifid with obtuse lobules, veinlets oblique simple each bearing a sorus near the middle, involucre rather broad reniform subcoriaceous firm persistent (often rich scarlet) the axis not in the direction of the vein but oblique rather inclined towards the costule, upper part of the rachis and costules beneath glanduloso-pubescent.—Lastrea, *Hook. Ic. Pl. t. 993 (or Century of Ferns, t. 93).*

Hab. Sarawak, Borneo, on limestone rocks, *Thos. Lobb.*—This is a very remarkable plant. The only specimen I possessed at the time my figures and descriptions were made, had a considerable tinge of red on the frond, and especially on the involucre. I have since received a more perfect specimen from the same locality, from "limestone hills," of which the stipes and rachis and the frond, the under side espe-

cially, including the involucre, are deeply tinged with almost a vermilion colour. This specimen has a portion of the caudex attached, about  $1\frac{1}{2}$  inch long, which would appear to be procumbent or scandent, stramineous, with numerous but sparse subulate scales, mixed with needle-shaped bristles; this caudex, together with the peculiarity of the texture and the obliquity of the involucre, induce me to think it may prove to be a *Davallia*.—Perhaps no part of the world, at this time, would yield a finer harvest of Ferns than Borneo.

91. N. (*Lastrea*) *ligulatum*, Hook.; “frond ovato-lanceolate pinnate, pinnæ opposite and alternate sessile linear caudato-acuminate very deeply pinnatifid, segments linear-oblong obtuse and obtusely serrulate ciliated separated by a rounded sinus, the acumen serrated at the base, veins distant, rachis pubescent above, sori inframarginal, involucre glabrous.” *Pr.*—*Lastrea*, *J. Sm. in Hook. Bot. Journ.* iii. p. 412 (*name only*). *Pr. Epimel. Bot.* p. 35. *Aspidium*, *Metten. Aspid.* p. 213. *Lastrea Philippina*, *Pr. Epimel. Bot.* p. 36.

Hab. Philippine Islands: Isle of Samar, *Cuming*, n. 343, and Luzon, n. 74.—This is a large handsome Fern, with fronds of a delicate texture, 2-3 feet long and pinnæ 7-9 inches long and 1 inch broad, the segments long and narrow, obtuse, with no very striking characters.

92. N. (*Lastrea*) *immersum*, Hook.; “caudex creeping, stipes elongated, 3-4 feet long, frond coriaceous (?) glabrous or finely pubescent with scattered glands beneath from a broad base ovato-oblong or oblong acuminate pinnate, pinnæ 8-10 inches long sessile articulated at the base (?) linear attenuated at each extremity long acuminate at the apex deeply pinnatifid, segments linear-oblong entire obtuse, sori immersed arranged between the costule and the margin of the segments, involucre reniform glabrous entire persistent.” *Metten.*—*Aspidium*, *Bl. En. Fil.* p. 156. *Metten. Fil. Hort. Lips.* p. 91. t. 18. f. 1-3 (*excellent*). *A. impressum (ex errore)*, *Kze. in Linnæa*, xxiii. p. 227. *Lastrea verrucosa*, *J. Sm. in Hook. Bot. Journ.* iii. p. 411. *Pr. Epim.* p. 36.

Hab. Java, *Blume, in Herb. Nostr.*, *De Vriese and Teijsmann*, n. 600, 722, and 461? (*with involucre apparently quite orbicular-peltate*), *Lobb*, n. 214. Luzon, *Cuming*, n. 438 and n. 72 (some specimens less than a foot long, others with pinnæ more than  $1\frac{1}{2}$  foot long). Assam, *Griffith*. Johanna Island, East Coast of Tropical Africa (involucre subpeltate), *Speke*.—None of the fronds of my specimens can be called “coriaceous;” there is a swelling around the base of the pinnæ, but scarcely an articulation. The species is closely allied to *N. ligulatum*.

93. N. (*Lastrea*) *apiciflorum*, Hook.; caudex short stout erect clothed above with subulate scales, stipes stout a span to a foot and more long scaly with appressed lanceolate scales at the base the rest and the stout very straight rachis

clothed with numerous close-pressed scales varying in shape from small-ovate to long-lanceolate, fronds 2-3-4 feet long oblong or suboval lanceolate acuminate coriaceous-membranaceous pinnate, pinnæ numerous alternate horizontal subfalcate 5-6 inches long often an inch broad from a broad sessile base oblong acuminate deeply even to the rachis pinnatifid (almost again pinnate), segments approximate parallelogram-oblong straight obtuse or retuse angulato-dentate at the apex, veinlets numerous simple or forked, sori 5-6 only at the apex of the frond, involucre firm-membranaceous reniform, costæ very paleaceous with appressed subbullate scales beneath. (TAB. CCXLVIII.)—*Aspidium*, Wall. Cat. n. 345. Metten. *Aspid.* p. 54.

Hab. Nepal, Wallich. Sikkim-Himalaya, 9000 feet, Hook. fil. et Thomson, n. 254 a.—A very distinct species, with pinnæ resembling those of *Neph. F.-mas*. The segments of the pinnæ are singularly obtuse, or truncate, or retuse, and only bear a few sori, 5-6, at the apex. The stout stipes and peculiarly stout rachis have a dirty and scurfy appearance, from the copious differently-sized scales. In drying, the fronds become deep brown, paler beneath.

94. N. (Lastrea) *Brunonianum*, Hook.; caudex short thick erect clothed as are all the nascent fronds with a dense mass of large subulato-lanceolate brown scales  $\frac{1}{2}$ – $\frac{3}{4}$  of an inch long, stipites tufted 4 inches to a span long swollen at the base and as well as the (usually) black rachis squamose with long dark-brown glossy lanceolato-subulate patent flexuose scales mixed with others quite setiform, fronds subcoriaceous-membranaceous a span to 12-14 inches long 2 inches broad moderately attenuated at the base very obtuse at the apex oblong-lanceolate pinnate, pinnæ approximate sessile horizontally patent oblong very obtuse deeply sometimes quite to the rachis pinnatifid, segments  $\frac{1}{4}$  of an inch long horizontal broad-oblong or oval very obtuse lobato-pinnatifid the margins strongly and very sharply serrated, the teeth spreading subsetaceous at the points, principal veins (or costules) flexuose, veinlets forked distant, sori 3-4 on each side the costule between it and the margin, involucre reniform. (TAB. CCLI.)—*Aspidium*, Wall. Cat. n. 344. Metten. *Aspid.* p. 54.

Hab. Kamaon, Wallich, on high mountains, Strachey and Winterbottom, n. 8, elev. 12,000 feet. Sikkim-Himalaya, 13,000-15,000 feet, Hooker fil. et Thomson, n. 259. Punjab, Jacquemont, n. 1189 c.—See remarks on *N. barbigerrum*, our next species.

95. N. (Lastrea) *barbigerrum*, Hook.; caudex stout erect short and together with the young nascent fronds clothed

with a dense mass of very large satiny scales mixed with soft golden and silky hairs, stipites a span to a foot long stout black brown only at the base (the rest and the rachises) clothed with very large satiny scales ovate and acuminate mixed with narrower ones, those upwards gradually pass into rich golden soft hair-like and flexuose scales, fronds  $1\frac{1}{2}$ -2 feet long 10 inches to a foot wide broad ovate-oblong scarcely acuminate pinnate or almost universally bipinnate, primary pinnæ subpetiolate oblong obtuse 4-5 inches long  $1\frac{1}{2}$  inch broad, pinnales sessile oblong deeply pinnatifid, lobules strongly dentate, the teeth divaricating with a very sharply acuminate and setaceous point, veinlets forked, sori mostly on the upper half of the frond as many as there are lobules to the pinnales.—*Lastrea barbiger*, T. Moore, in *Herb. Hook.*

Hab. Kamaon (mixed with *Brunonianum*), Wallich, n. 344, Strachey (same locality as *Brunonianum*). Simla, Col. Bates. Sikkim-Himalaya, 12,000-13,000 feet, Hooker fil. et Thomson, n. 258.—The scaly clothing of this plant is the most beautiful of any Fern I know, especially in the young and nascent state of it. I have before me a specimen of a quite undeveloped frond, 5 inches long, the frondose portion still rolled in like the head of a crosier; the young stipes is a mass of the brightest chestnut coloured scales that can be conceived,  $1\frac{1}{2}$  inch long, and some of the scales  $\frac{1}{2}$  of an inch broad, the head or crosier-part 2 inches broad is a golden mass of similar scales. In another young frond, quite erect, the pinnæ,  $1-1\frac{1}{2}$  inch long, resemble a fox's tail in miniature: these are clothed with rich golden silken hairs concealing all that is green. In the fully developed fronds, much of this vestiture still remains attached to the rachises and costæ. But beautiful as all this is, and bipinnate as is almost every specimen, I fear that it is only a more perfect form of *N. Brunonianum*, and as such I believe it was considered by all the collectors; the latter form being more alpine (elev. 15,000 feet), thence becoming stunted, contracted, and black in the stipes and main rachis.

96. N. (*Lastrea*) *crassifolium*, Hook.; stipites  $1\frac{1}{2}$  foot long and as well as the rachis dirty-brown glossy, fronds  $1\frac{1}{2}$  foot long ovato-lanceolate acuminate firm-membranaceous olive-green pinnate pinnatifid at the apex, subdimorphous, pinnæ 4-5 inches long finely acuminate, sterile ones elliptical-oblong  $1-1\frac{1}{2}$  inch broad with one or two pairs of the inferior veins united (subnephroid), fertile ones oblong-lanceolate  $\frac{2}{3}$  of an inch broad with the lower veinlets approximate but free (lastreoid), both with a truncate or more or less cuneate subpetiolated base, the margin about halfway down pinnatifid with oval subfalcate lobes, sori copious dorsal near the middle of all the veinlets.—*Aspidium*, Bl. *En. Fil. Jav.* p. 158. *Lastrea lata*, J. Sm. in Hook. *Journ. Bot.* p. 412 (name only). *Aspid.*, Kze. Metten. *Aspid.* p. 95. L. similis, J. Sm. l. c. (name only.)

Hab. Java, *Blume, in Herb. nostr.* Luzon, *Cuming, n.* 266, and Malacca, *n.* 390. Malay Peninsula, *Sir Wm. Norris.* Penang, *Dr. Lorrain, n.* 155, 137 (lower pinnae much petiolated, and all of them much elongated and tapering from near the middle). Labuan, *Motley.*—Of this Fern my only sterile specimen is from Labuan, and that is larger in all its parts than the fertile, and has some veinlets which are quite nephrodioid. As a species, its nearest affinity among the Indian species is, perhaps, with *N. spectabile*. Mr. J. Smith compares it to *Aspid. falciculatum* of Raddi; but to the known species of the new world, it comes, perhaps, nearest to *N. triste*.

97. *N. (Lastrea) spectabile*, Hook.; "caudex erect  $\frac{1}{2}$  an inch in diameter and together with the base of the stipes clothed with long brown ovate acuminate scales, stipites 1 foot and more long and with the rachis and primary costae elongated stramineous glabrous, fronds  $1\frac{1}{2}$ –2–3 feet long  $1$ – $1\frac{1}{2}$  foot broad membranaceous firm broad-oblong or ovate acuminate pinnate, pinnæ patent 1–2 inches broad from a truncate or subcuneate base oblong acuminate deeply pinnatifid three-quarters or four-fifths of the way to the costae, segments oblong or broad-oblong rather obtuse subfalcate rather sharply serrated the sinuses rounded at the base and there furnished with a short ligulate but very distinct tooth or gland, veinlets conspicuous flexuose forked, sori small on a superior branch rather nearer the margin than the costule, involucre small rotundato-reniform." *Kze.*—*Aspidium, Bl. En. Fil. p.* 158. *Kze. in Bot. Zeit. ii. p.* 261. *Metten. Aspid. p.* 112. *Lastrea, J. Sm. in Hook. Journ. Bot. iii. p.* 412.

Hab. Java, *Blume, in Herb. nostr.* Luzon, *Cuming, n.* 1314. Moulmein, *Parish, n.* 153. Malay Peninsula, *Sir Wm. Norris.* Khasya and Assam, *Griffith, Simons.* Sikkim, *Hooker fl. and Thomson, n.* 152. Nilghiri, *Beddome, n.* 129.—The specimens from the Malay Peninsula of Sir Wm. Norris are of a firmer and more coriaceous texture, and in that respect more resemble *N. crassifolium*; but all have the essential character of the tooth, or gland, as Kunze calls it, in the sinus of the segments.

98. *N. (Lastrea) hirtipes*, Hook.; caudex short thick erect and as well as the stout tufted stipites and rachis densely crinite with large long subulate intensely black flexuose scales (more or less deciduous), fronds 2–3 feet long subcoriaceous ovato-lanceolate pinnate confluent pinnatifid at the apex, pinnæ 3–6–8 inches long more or less remote horizontally patent from a truncated or subcordate and nearly sessile inauriculate base oblong long-acuminate variously lobed or pinnatifid or crenated or even serrated at the margin, lobes obtuse or acute, veins pinnate, sori dorsal upon the veinlets remote from the margin, involucre small reniform subcoriaceous. (TAB. CCXLIX.)—*Aspidium, Bl. En.*



*Fil. Jav. p.* 148. *Aspidium atratum*, *Wall. Cat. n.* 380. *Kze. in Linnæa*, xxiv. *p.* 378. *Metten. Aspid. p.* 53.

Hab. India, very abundant: Nepal, *Wallich*; Eastern Bengal to Himalaya, *Griffith, Hooker fil. and Thomson*; Nilghiri, *Wight, M'leor, Schmidt, Beddome*. Ceylon, *Walker, Thwaites, Gardner*. Java, *Blume, in Herb. nostr.* Moulmein, *Parish*.—Quite distinct from any other of this section, readily recognized by the very peculiar intensely black scales on the caudex, stipes, and rachis, giving them a shaggy appearance.

\*\*\*\* *Bi-tripinnate or decompound.* Sp. 99–152.  
(*Filix-mas*-group, Sp. 99–115.)

99. N. (*Lastrea*) *Filix-mas*, *Rich.*; caudex short stout erect densely paleaceous with broad-lanceolate scales varying much in colour, stipites tufted short (a span or more long) copiously scaly below with the same large scales as the caudex, higher up the scales become narrower and at length on the rachis subulate very abundant dark-brown to rich golden-tawny, fronds firm-membranaceous or coriaceous a span to 2–3 feet or more long broadly oblong-lanceolate acuminate pinnate, pinnæ 3–5 inches long  $\frac{1}{2}$ – $\frac{3}{4}$  of an inch wide approximate sessile from a broad base oblong acuminate usually deeply nearly to the rachis pinnatifid, segments oblong obtuse sometimes truncated at the apex and thus forming a parallelogram more or less toothed or serrated, or bipinnate or even tripinnate with the ultimate pinnules in shape resembling the segments but sometimes elongated and incisoserrate, veinlets simple or forked, sori dorsal arranged in two series nearer the costæ than the margin, involucre generally large very convex orbiculari-reniform with a deep sinus glabrous.—*Rich. in Desv. Mém. Soc. Linn. vi. p.* 260. *Hook. Brit. Ferns, t.* 15. *Hook. Fil. Exot. t.* 98 (*a large form that has been called paleaceum*). *Aspidium, Sw. Syn. Fil. p.* 55. *Schk. Fil. p.* 45. *t.* 44. *Willd. Sp. Pl. v. p.* 259. *Engl. Bot. t.* 1458, and *t.* 1949 (“*Aspid. cristat.*”). *Engl. Fl. iv. p.* 275. *Hook. et Arn. Brit. Fl. ed. 8. p.* 584. *Lastrea, Pr. Polypodium, Linn. Polystichum, Roth.* (The following are the varieties which I deem worthy of notice, the normal form (or *a*) being considered that which is represented at tab. 15 of our ‘British Ferns,’ with the pinnæ pinnatifid rarely again pinnate, the segments oblong obtuse rounded at the point, not truncated.)

Var.  $\beta$ , *parallelogrammum*; pinnate or rarely subbipinnate their segments oblong-parallelogram very close and compact. *Aspid. parallelogrammum, Kze. in Linnæa, xiii. p.* 140.

Var.  $\gamma$ , *elongatum*; bi-tripinnate, ultimate pinnules elongate often broader at the base inciso-pinnatifid. *Aspidium depas-tum*, Schk. *Fil.* p. 50. t. 51 (evidently an injured specimen). *Aspid. erosum*, Schk. *Fil.* p. 46. t. 45? *Aspid. remotum*, A. Braun. *Nephrodium*, Hook. *Brit. Ferns*, t. 22? *Aspidium elongatum*, Sw. *Syn. Fil.* p. 55. *Neph. elongatum*, Hook. et Grev.  *Ic. Fil.* t. 234. Lowe, *Fl. Mad.* p. 527. *Aspidium*, Willd. *Sp. Pl.* v. p. 269. Metten. *Aspid.* p. 63. *Aspid. Canariense*, A. Braun, *Flora*, 1841, p. 708. Metten. *Aspid.* p. 64. *Aspid. Ludovicianum*, Kze. in *Sillim. Journ.* 2d. Ser. vi. p. 84. *Chapm. Fl. S. U. St.* p. 595. Metten. *Hort. Fil. Lips.* p. 93. *Nephrod. Floridanum*, Hook. *Fil. Exot.* t. 99. *Aspid.*, *Chapm. Fl. S. U. St.* p. 595. *Aspid. Schimperianum*, Hochst. and A. Braun, *Flora*, 1841, p. 708.

Var.  $\delta$ , *cochleatum*; bi-tripinnate often very large, primary divisions sometimes long-petioled or in other words the rachis is branched, sori large so that they cover and conceal the whole under side of the pinnules, involucre remarkably large very convex their margin singularly inflected (possibly diseased). *N. cochleatum*, Don, *Prodr. Fl. Nep.*

I shall give other synonyms under the following localities, chiefly derived from my own herbarium.

HAB. EUROPE. Throughout Great Britain and Ireland, and equally common throughout Europe. The var. *paleaceum* of Mr. Moore, of which the rachis is richly clothed with spreading, subulate, long, slender, glossy scales, approaches in form, pinnæ, and segments, the var.  $\beta$ , but is smaller and not at all coriaceous. From Pembrokeshire and from Surrey, Mr. Moore, from Dunkeld, Mr. Black, and from Somerset, Mr. Clarke, have sent me specimens of var.  $\gamma$ ; and I have the same from the Caucasus, and the South of Russia and Persia, under the name of *Aspid. affine*, Fischer, *ms.* Asia Minor, var.  $\beta$ , Forbes.

AFRICA. The var. *paleaceum*, more closely resembling var.  $\beta$ , was found in Madeira by the late Dr. Lemann, and is named, in my herbarium, N. *affine*, Lowe (*ms.*); but far more common there is var.  $\gamma$  (A. *elongatum*, Sw.). It is equally abundant in Canary, Azores, Webb, and others (*Asp. Canariense*, A. Braun), and in the Cape de Verde, Forbes. Island of St. Thomas, alt. 6000 feet (quite our var.  $\beta$ ). Cape of Good Hope, var.  $\gamma$ , Doom-kop, Burke, var.  $\delta$  (quite tripinnate, closely approaching *N. inaequale*). Abyssinia, Schimper, n. 6, and n. 523. Tropical West Africa: Marambala, alt. 2500 feet, Kirk, Zambesi Mission, var.  $\gamma$ . Bourbon, var.  $\gamma$ , tripinnate (in *Herb. nostr.*); also in Mauritius, Bouton.

NORTH AMERICA. Woods, Monterrey in California, Hartweg, n. 2039, common form; but this does not appear to have been found anywhere in the United States or in British North America,\* from the Atlantic to the Pacific, but now that I have seen more of the varied forms of this species from other countries, I am disposed to refer my *N. Floridanum* (*Fil. Exot.* t. 99) to it. It partakes of the common form in the inferior and sterile portion, whilst the superior and fer-

\* Kunze, however, says (*Sillim. Journ.* 2d. ser. v. 6. p. 83), "I have seen the true *Filix-mas* from Newfoundland."

tile portion is bipinnate, as in our var.  $\gamma$ , with the pinnules contracted. It is from East Florida, *Buckley*. The *Asp. Ludovicianum*, *Kze.*, I have not seen (native of Florida to Louisiana); but since Mettenius places it with *A. Canariense*, it is probably what I should call var.  $\gamma$  of *Filix-mas*. Pursh's *Asp. Filix-mas*. (*in Herb. nostr.*) proves to be my *N. Goldieanum*; his var.  $\beta$ , from South Carolina, is no doubt our var.  $\gamma$ .

TROPICAL AMERICA. All my specimens from Mexico and Guatemala, from *Skinner*, *Hartweg*, n. 570, *Galeotti*, n. 6348, with the single exception of *Liebmann's*, which has narrower and distant segments to the pinnæ, rounded at the apex (which yet is his *Aspid. parallelogrammum*, *Kze.*); and all from Ecuador, *Spruce*, n. 5648, *Jameson*, *Hartweg*, n. 1512; Peru, *Mathews*, n. 1848, *Lechler*, n. 2020; from New Granada, *Holton*, n. 68, *Hartweg*, n. 1512, *Linden*, n. 521, *Schlim*, n. 311 (*Aspid. crinitum*, *Mart. and Gal. Fil. Mex. t. 17. f. 2*); and Brazil, near the summit of the Organ mountains, n. 5944: all are true var.  $\beta$ , parallelogrammum, *Kze.*, with long, crinite, paleaceous scales, and quite parallelogrammic close-placed segments and coriaceous fronds.

EAST INDIA, continental. The normal European form is perhaps the least common, and mainly confined to North-west India, often at great elevations, *Jacquemont*, *Edgeworth*, *Strachey and Winterbottom*, *Wallich* (*Aspid. patentissimum*, *Wall. Cat. p. 340*). Sikkim, alt. 8,000–10,000 and even 15,000 feet (and then small), *Hooker fil. et Thomson*. Nilghiries, *Wight*, *Beddome*. Nepal, *Wallich*.—Var.  $\beta$  is perhaps the next most common, and from localities too numerous to be worth recording, generally in mountain and northern districts, yet by no means confined to them.—The most abundant form of all is assuredly our var.  $\gamma$ , *elongatum*, varying exceedingly in size and composition, and is *Asp. marginatum*, *Wall. Cat. n. 391*; from the Nilghiries (*Beddome*, n. 127) to Khasya, and along the Himalayas, most common, to Boutan in the East. But there is a peculiarity in many of their forms in the large size, and the great convexity of the rotundato-cordate involucre, as above noticed under var.  $\delta$  (it should rather perhaps be a subvar. of  $\gamma$ ), not unfrequently produced on dimorphous fronds; that is the pinnules of the sterile fronds are unusually large, while those of the fertile fronds are much contracted, or the upper half of the frond is fertile and the pinnules there alone contracted, such plants at first sight remind one of *Osmunda regalis*. They seem not to be confined to any particular locality, and I think it is Mr. Moore has suggested that the fructifications are in some degree diseased. Even in Europe the involucre of *Filix-mas* are often larger and more convex in some specimens than others. The Indian state with the large involucre is *Arthrobotrys avara*, *Wall. Cat. n. 1034*, *Nephrod. cochleatum* of *Don*, and *Arthrobotrys macrocarpa*, *Wall. Cat. n. 395*.

CHINA. Hongkong, *Urquhart*, *Champion* (*Aspid. Championi*, *Benth. Fl. Hongkong. p. 456*, and *p. 30 of this volume*). North China: Manchuria, *Schrenck*; Port Hamilton and Isle of Tsus-Sima, *Wilford*.

JAPAN. I have fine specimens from Hakodadi, gathered by *C. Wright*, of *Filix-mas* in the really normal state, and I am tempted to bring hither the *Lastrea lacera*, *Eat. in the Proc. Acad. Sc. Philad. 1859. p. 110*, which that able pteridologist has ascertained to be the *Polypodium lacernum* of Thunberg; "frondibus e caudice brevi crasso pluribus stipite breviori valde paleaceo insidentibus subcoriaceis glabris subtus albicantibus oblongis acutis bipinnatis; pinnis late lanceolatis acuminatis pinnatis v. pinnatifidis, intermediis longioribus, superioribus contractis fructiferis; segmentis oblongis vel falcatis acutis serratis, basilaribus nunc utrinque subauriculatis; soris confertis demum confluentibus; indusio orbiculari usque ad medium fisso sinu clauso lateribus inflexis. Simoda, Japan, *C. Wright*" (*Eaton*). My specimens from Tsus-Sima are identical with these.—Mr. Eaton has favoured me with two perfect specimens; both have the glossy paleaceous clothing of the handsomest states of *Filix-mas*. One has the pinnæ scarcely more than pinnatifid, and the upper fructified portion slightly contracted; the other

has the upper fertile portion contracted, but the whole is bipinnate with subhastate and subpinnatifid pinnules, and may safely, I think, take place with our var.  $\gamma$ .

CEYLON. Var.  $\beta$ , *Gardner*, n. 1364.

MALAY ISLANDS AND PENINSULA. Java, *Blume*, var.  $\beta$  (*Aspid. uliginosum*, *Blume*, in *Herb. nostr.*, and *A. adnatum*, *Bl.* in *Herb. nostr.*), *De Vriese and Teijsmann*, n. 587,  $\gamma$ ; Penang, *Lady Dalhousie*; Java, *De Vriese and Teijsmann*, n. 289 and 588.

SANDWICH ISLANDS, alt. 8,000–10,000 feet, *Brackenridge*, in *Herb. nostr.* (*Lastrea truncata*, *Brack. Fil. U. S. Expl. Exped.* p. 195. t. 27, excellent). The appearance of this plant (which Brackenridge justly says is closely allied to *Aspid. elongatum*, Sw., our *F.-mas*) is remarkable, for the species has hitherto been detected nowhere else in the Polynesian Islands, nor in any part of the great Australian continent.

When it is considered that *N. Filix-mas*, in England alone, has fourteen "principal variations" enumerated, it will not surprise any one to learn that the same species found in very different parts of the globe, especially of the southern hemisphere, varies in a still more remarkable degree; and hence the numerous synonyms here adduced, mostly from authentic specimens in my herbarium; many more might be added if it was worth the trouble. I would, in particular, wish to direct the attention of South African botanists to the *N. (Lastrea) inaequale* of Schlechtendal, to endeavour to determine if that be not a very compound form of *F.-mas*.

Mr. Bentham's *Aspid. Championi* (our *Aspid.* n. 35), taken up from imperfect specimens in my herbarium, is, I regret to say, only *N. Filix-mas*, a common bipinnated form. I spoke, under n. 35 of my specimens having been mislaid. I have since detected them in their right place, along with other specimens of *F.-mas*, which I had overlooked in my search.

100. *N. (Lastrea) microstegium*, Hook.; caudex?, stipes a span long stout tawny-brown laxly scaly, rachis and costæ stout stramineous, frond 2–2½ feet long broad-lanceolate membranaceous glabrous acuminate bipinnate, pinnæ sessile 4–5 of the lowest pairs shorter 4 inches long sterile and with broader and more approximate pinnæ intermediate ones 6–8 inches long from a broad base oblong gradually acuminate, pinnules ¾ to nearly an inch long from a broad sessile and quite adnate base pyramidally and obtusely acuminate pinnatifid about halfway down to the costæ all connected at the very base by a narrow costal wing, lobes or segments small ovate blunt entire, veinlets distant, sori minute 4–6 on each lobe in two series halfway between the costule at the margin, involucre very small reniform pale greenish-brown. (TAB. CCL.)

Hab. Khasia, temperate region, *Hooker fil. and Thomson*.—I find only one specimen of this in Hooker and Thomson's Indian collection. It is remarkable for the broad adnate base of the pinnules, which, tapering gradually from that base towards the apex, have quite a pyramidal form, and there is always a very narrow membranaceous margin or wing to the secondary rachises, which connects the several pinnules. The lower and shorter pinnæ of the frond, which are sterile, have broader segments, and are rather pinnatifid than pinnate.

101. *N. (Lastrea) rigidum*, Desv.; caudex short stout erect densely paleaceous as are the tufted stipites which are 4–5 inches long, fronds 8 inches to 1–2 feet long oblong acuminate firm-membranaceous erect subrigid glandular beneath and fragrant bipinnate, pinnæ horizontal lower primary ones remote the rest approximate 2–3 inches long from a broad sessile base sometimes an inch broad gradually tapering to a point, pinnules sessile subdecurent oblong strongly inciso-serrate, the serratures very sharp, those of the basal pinnæ pinnatifid not very deeply, the segments serrated, veinlets mostly forked, sori in two rows between the costule at the margin at length confluent, involucre exactly reniform very convex firm glandular and fringed with glandular hairs, main rachis chaffy.—*Hook. Brit. Ferns*, t. 16. *Aspidium*, *Sw. Syn. Fil.* p. 53. *Schk. Fil.* p. 40. t. 38. *Willd. Sp. Pl.* v. p. 265. *Hook. Suppl. to Engl. Bot.* t. 2724. *Hook. et Arn. Brit. Fl. ed.* p. 585. *Metten. Aspid.* p. 56. *Lastrea*, *Pr. Polypod., Hoffm., De Cand.* *P. fragrans*, *Vill.*—*Var. pallidum*; fronds generally larger, pale-green. *Hook. Brit. Ferns*, l. c. *Aspid. pallidum*, *Link, Fil. Hort. Berol.* p. 107. *Nephrod., Bory, Fl. Peloponn.* p. 67. t. 88 (*good*). *Webb, Phytog. Canar.*—*Var. Americanum*; fronds twice or thrice larger scarcely at all glandular. *Hook. Brit. Ferns*, l. c. *Aspidium argutum*, *Kaulf. En. Fil.* p. 242. *Hook. et Arn. Bot. of Beech. Voy.* p. 162.

Hab. South of Germany, Alps of Switzerland and Savoy, and mountainous districts in the west of England and in Ireland. In Asia Minor and the islands of the Mediterranean, it is usually larger and of a paler colour, and becomes the *Aspid. pallidum* of Link. The American form is again much larger, and seems to be peculiar to California and Sierra Madre, North-west Mexico.—As a species, this has a close affinity with the more narrow-pinnuled forms of the *elongatum*-var. of *F.-mas*. (See observations on *N. rigidum*, in 'British Ferns,' l. c.)

102. *N. (Lastrea) erythrosorum*, Eat.; "fronds bipinnate ovato-oblong, pinnæ subopposite lanceolate a little narrower at the base, pinnules oblong obtuse or truncated serrated, veins forked, sori distant from the margin upon a superior veinlet, involucre reniform intensely red the margin white entire, scales of the rachis narrow-linear, of the secondary costæ linear from an orbicular base crisped." *Eat. (TAB. CCLIII.)*—*Eat. in Williams and Morrow's Pl. of Japan*, p. 330.

Hab. Simoda, Japan, *C. Wright, Oldham*. Tsus-Sima, Gulf of Corea, *C. Wilford*, n. 759.—This is a very beautiful species, owing to the fine red colour of the involucre. In habit it approaches the *Aspidium varium*, Sw., and as I have described that as having nephrodiaceous involucre, so this has some involucre which ap-

pear to me quite aspidiaceous. In all my perfect specimens, the base of the stipes is thickly clothed with very long, glossy, black, lanceolato-subulate scales, having brown margins. The involucre is quite plane.

103. *N. (Lastrea) cristatum*, Mich.; caudex short stout erect or oblique densely paleaceous, stipites tufted stramineous rather stout paleaceous, fronds straight glabrous erect oblong-lanceolate 1-1½ foot long pinnate, pinnæ 2 inches long an inch or more broad at the base, shortly petiolate from a broad base oblong but gradually acuminate deeply pinnatifid the lowermost pairs distant deltoideo-acuminate and obtuse rarely at the base pinnate, pinnules or segments of the pinnæ ovate or oblongo-ovate subspinuloso-serrate, veinlets mostly forked, sori chiefly on the upper half of the frond copious, in two rows upon each segment, involucre slightly convex the margins entire.—*Mich. Fl. Bor. Am.* ii. p. 269. *Hook. British Ferns*, t. 17. *Aspid., Sw. Syn. Fil.* p. 52. *Willd. Sp. Pl.* v. p. 253. *Schk. Fil.* p. 39. t. 27 (good). *Engl. Bot. t.* 2125 (not t. 1959, which is probably *N. Filix-mas*). *Hook. in Fl. Lond. t.* 113 (very accurate). *Metten. Aspid.* p. 56. *Hook. et Arn. Brit. Fl. ed.* 8. p. 585 (excl.  $\beta$  and  $\gamma$ ). *Asa Gray, Man. of Bot. Illustr.* p. 598. *Lastrea, Pr. and others.* *Polypod., Linn. Polystichum, Roth, Koch. Aspid. Callipteris, Ehrh. A. Lancastriense, Sw. Schk. Fil.* p. 44. t. 41.

Hab. Temperate and colder parts of Europe and the United States, Canada and the Hudson's Bay territories, east of the Rocky Mountains.—I have always considered this a well-marked species, although a plant called *Lastrea uliginosa* has been united with it, which I believe rather to be a state of *N. spinulosum*.

104. *N. (Lastrea) Goldieanum*, Hook.; caudex stout suberect, stipites tufted a span to a foot long bright stramineous very paleaceous at the base with large ovate acuminate glossy scales some dark-brown others pale ferrugineous, fronds large 1½-2½ feet long ovato-oblong acuminate submembranaceous pinnate, at the base subbipinnate, pinnæ 5-6-8 inches long 1½-2 inches wide petiolate deeply pinnatifid all except the superior ones nearly to the base, segments rather distant oblong subfalcate acute sharply and coarsely serrated the base decurrent, the lowest pinnule may be said to be pinnated but the decurrent bases form wings which extend more or less to the petioles, veinlets once or twice forked, sori on the superior branch distant forming two series much nearer the costule than the margin, involucre rather small membranaceous reddish-brown cordato-reniform plano-convex.—*Hook. et Grev. Ic. Fil.* t. 102. *Aspid., Hook. in Ed. Phil.*

*Journ.* vi. p. 333. *Metten. Aspid.* p. 92. *Asa Gray, Man. Bot. Illustr.* p. 598. *Lastrea, Pr., and others.* *Aspid. Filix-mas, Ph. Fl. Am.* ii. p. 662.

Hab. Canada, *Goldie, Pursh, Herb. apud nos.* United States, rich and moist woods, from Connecticut to Kentucky and northwards, *Asa Gray*.—Pursh mistook this for *N. Filix-mas*, from which, as from every other species, it is very distinct.

105. *N. (Lastrea) marginale*, Mich.; caudex short thick stout densely clothed with large glossy ferruginous or almost golden scales, stipites tufted similarly paleaceous a span to a foot high, fronds subcoriaceous 1–1½ foot long broad-oblong acuminate bipinnate, pinnæ rather distant sessile or nearly so oblong acuminate 4–4½ inches long by 1 inch broad, pinnules also rather distant sessile ½–¾ inch long oblong very obtuse subfalcate sessile lobato-pinnatifid especially at the base which is sometimes obtusely auricled on both sides more so on the lower, veinlets once or twice forked, sori terminal on the upper branch quite marginal, involucre cordato-reniform membranaceous convex with a deep sinus.—*Mich. Fl. Bor. Am.* ii. p. 267. *Aspidium, Sw. Syn. Fil.* p. 50. *Willd. Sp. Pl.* v. p. 259. *Schk. Fil.* p. 195. t. 45 b. *Asa Gray, Man. of Bot. Illustr.* p. 598. *Metten. Aspid.* p. 55. *Lastrea, Pr., and others.*

Hab. Middle United States and Canada, common.—Well distinguished by its uniform structure and marginal sori.

106. *N. (Lastrea) fragrans*, Rich.; caudex large stout short densely rufopaleaceous with large soft glossy silky spreading scales which extend to the tufted short stipites and continue of a smaller size upwards to cover more or less the whole back of the frond, fronds 3–10 inches high 1½ inch wide exactly lanceolate acuminate attenuated below, coriaceous bipinnate, pinnæ approximate except the lower ones, from a broad base oblong-lanceolate obtuse, pinnules very small scarcely a line long approximate oblong crenato-dentate, involucre about four on each pinnule mixed with chaffy scales orbiculari-cordate membranaceous scarcely convex.—*Richards, in App. to Frankl. Journ.* p. 783. *Hook. and Grev. Ic. Fil.* t. 70. *Aspid., Sw. Syn. Fil.* p. 51. adn. 67. *Willd. Sp. Pl.* v. p. 253. *Asa Gray, Man. of Bot. Illustr.* p. 598. *Polystichum, Ledeb. Fl. Ross.* iv. p. 514. *Lastrea, Pr., and others.* —β, slender submembranaceous very sparsely scaly.

Hab. High arctic or subarctic regions, Europe, Asia, and America. The Caucasian Alps (*Dr. Fischer*) are the most southern latitude in Europe; as, in North America, Penossee Iron range, Wisconsin, lat. 46° 15' N. (*J. A. Lapham*): and

it is remarkable that the only specimens from those regions are what I here consider the var.  $\beta$ .—It is one of the most beautiful of all Ferns, in the minutely-divided fronds, full-green, destitute of scales above, while the whole of the rest of the plant is richly paleaceous with aureo-nitent scales. My finest specimens are from Russian North-west America (*Seemann*), and from Manchuria (*Wilford*), and the Amur (*Maximowicz*).

107. N. (*Lastrea*) *Falconeri*, Hook.; caudex ?, stipes a foot long very coarse and stout quite squarrose for nearly its whole length with large broad silky ferruginous soft scales mixed with smaller subulate ones, these latter only still smaller also clothe the main and secondary rachises, fronds  $1\frac{1}{2}$  foot long oblong scarcely acuminate firm rigid coriaceous slightly villous bipinnate, pinnæ 4–6 inches long an inch wide erecto-patent oblong-lanceolate, pinnules sessile linear-oblong  $\frac{1}{2}$ – $\frac{3}{4}$  of an inch long about halfway down pinnatifid with short round entire lobes, the margins reflexed, sori rather large copious one to each lobe, involucre brown very membranaceous cordato-reniform very convex so as to be almost hemispherical. (TAB. CCLIV.)

Hab. Kashmir, *Falconer*.—This is a most distinct and very beautiful species, with not a little of the habit of *N. fragrans*, but, if I may so say, upon a gigantic scale; the pinnules are lobed, so as to resemble those of the small *Gleichenias* of South Africa. The rachises appear to be resinoso-glandulose.

108. N. (*Lastrea*) *Napoleonis*, Bory; caudex a short thick rhizome densely crinite clothed with very long erect flexuose linear subulate glossy brown scales, stipites tufted 4 inches to a span and more long smooth and glossy scaly only at the very base (as is the caudex), fronds 6–12 inches and more long coriaceous deltoid or deltoid-ovate acuminate glabrous and scaleless pinnate or usually more or less bipinnate below, pinnæ sessile oblong acuminate deeply pinnatifid with oblong segments very obtuse and toothed at the margins, those of the lower pinnæ and the pinnules of the lowest pinnæ more elongated, those of the lowest pair on the lower side most elongated especially at the base subacuminate and pinnatifid the lobes coarsely serrated, veinlets simple or forked, sori copious large close to the costule, rachis and costæ rigid and polished. (TAB. CCLV.)—*Aspid.*, Bory, in *Belang. Voy. Ind. Or. Bot.* p. 61. t. 6. *Metten. Aspid.* p. 61.

Hab. St. Helena: close to Napoleon's tomb, *Wallich*, *Belanger*, *Cuming*, n. 434; on walls, rocks, and in woods near Diana's Peak, alt. 2000 feet, *J. D. Hooker*, *Harvey*, *Seemann*, etc.—This rare and distinct species is peculiar, we believe, to the locality above-mentioned.

109. N. (*Lastrea*) *cognatum*, Hook.; caudex stout short



erect densely squamose, stipites tufted a span to 1 foot long stout sometimes  $\frac{1}{2}$  an inch broad very densely clothed with dark-brown opaque scales of two kinds some large and ovato-acuminate squarrose others much smaller appressed and more subulate but similar ones are copious on the rachis and on the costæ beneath, fronds 1-3 feet long very coriaceous almost black when dry ovate or subdeltoid acuminate pinnate or below bipinnate, pinnæ approximate 4-6 inches long subpetiolate 1-2 inches broad from a broad base oblong acuminate deeply pinnatifid, the segments (or the pinnules where bipinnate) oblong very obtuse those of the upper pinnæ entire, those of the inferior ones crenate or pinnatifid more or less deeply, the basal pinnules of the lowest pair of pinnæ are longer than the rest, veinlets simple or forked, sori copious halfway between the costule and the margin, involucre cordato-reniform membranaceous convex entire. (TAB. CCLVI.)—*Lastrea*, *Pr. Epimel. Bot. p. 40.* *Aspid., Metten. Aspid. p. 61.*

Hab. Diana's Peak, alt. 2700 feet, St. Helena, *Roxburgh, Cuming, n. 428, J. D. Hooker, Seemann.*—A very distinct plant of extremely coarse and robust character, calculated to brave the storms and sea-blasts of its very exposed position. Dr. Hooker observes, "spreading habit of a Tree-fern, but not arborescent; fronds 4-5 feet high," including the rather short stipites.

110. N. (*Lastrea*) *Ascensionis*, Hook. ; caudex a stout thick ascending rhizome perfectly shaggy with the thick covering of linear-subulate dark-chestnut paleaceous scales many full an inch long, stipites densely tufted 4-6 inches long stout more than  $\frac{1}{4}$  of an inch wide quite squarrose with patent scales like those of the caudex but smaller and similarly mixed scales abound upon the rachis and on the under side of the costæ, fronds 6-8 inches long ovate or oblong-ovate obtusely acuminate probably thick and fleshy when fresh lurid-green very coriaceous and quite black when dry especially on the upper side, dark-brown beneath, bipinnate pinnate at the apex, pinnæ 3-4 inches long lower ones ovato-lanceolate upper ones lanceolate and pinnatifid more than halfway down with ovate obtuse coarsely serrated segments, pinnules of the lower pinnæ exactly resembling the superior pinnæ, veinlets few simple or forked, sori one to each lobe of the pinnæ or pinnules, involucre cordato-reniform membranaceous. (TAB. CCLVII.)

Hab. Top of Green Mountain, Ascension Island, alt. 1200-1800 feet, *J. D. Hooker, Dr. Lyall, Seemann.*—The very coriaceous texture, short and thick

stipites, coarsely squarrose with narrow patent scales, readily distinguish this from *N. Napoleonis*, as the much smaller size and very different scales do from *N. cognatum*.

111. *N. (Lastrea) inæquale*, Hook.; "fronds glabrous pinnate, pinnæ diminishing in size towards the apex confluent pinnate or pinnatifid, pinnules oval obtuse obliquely cuneate at the base the lower margin decurrent toothed incised or pinnatifid all fructiferous, stipes and rachises subpaleaceous, caudex prorepent." *Schlecht.*—*Aspidium*, *Schlecht. Fil. Cap. p. 23. t. 12. Kze. in Linnæa*, x. p. 549. *Metten. Aspid. p. 64. Lastrea, Pr.*

Hab. Frequent in various parts of South Africa, *all travellers*; first detected by *Bergius, Mund and Maire*.—I possess specimens of this from various botanists, Drège, Capt. Garden, All. Cunningham, Harvey, etc., and several of them well-corresponding with Schlechtendal's figure; others so closely allied to some of the common European forms of the bipinnate *N. Filix-mas*, that I am doubtful whether to refer them to the one or to the other. The same is the case with a fine specimen from Fernando Po (*Gustav Mann*), which is subtripinnate, with a very large frond. I have, indeed, one specimen, "*β, montanum, Kze.*; contractum pusillum coriaceum pinnatum pinnis pinnatifidis, soris copiosis confluentibus," from Drège, which is quite the normal form of *N. Filix-mas*. No one seems to have noticed its close resemblance to states of that species; but Mettenius places it next to *Canariense*, which I consider not to be specifically different from *F. mas*. It is true, the only portion of a caudex I possess is subhorizontal, and the scales are longer and more uniformly narrower than in *F. mas*, and the stipites appear less tufted and longer, and nearly free from scales; but we know how the paleaceous covering varies in many Ferns, and in *F. mas* in particular.

112. *N. (Lastrea) athamanticum*, Hook.; caudex?, stipes a foot or more long testaceous stout as well as the primary and secondary rachises very paleaceous at the base with copious long linear scales and numerous ferrugineous hair-like ones, fronds 1-2 feet long oblong shortly acuminate coriaceous-membranaceous tripinnate, lower primary pinnæ remote long-petioled upper ones crowded all erecto-patent 5-6 inches long, secondary pinnæ sessile oblong acute ultimate ones lanceolate deeply pinnatifid with oblong-lanceolate entire or sinuato-serrate segments the larger ones contracted at the base distant but decurrent sometimes subpinnatifid, veinlets forked, sori copious on the upper portion of the frond one on each small lobe or lobule 2-4 on the larger ones, involucre very orbicular subreniform nearly plane. (TAB. CCLVIII.)—*Aspidium*, *Kze. in Linnæa*, xviii. p. 123. *Metten. Aspid. p. 65. Lastrea Plantii, Moore, in Hook. Journ. Bot. v. p. 226.*

Hab. South Africa: eastern districts of the Cape Colony, Natal, *Pappe, Gueinzus, Plant, Capt. Garden*, to the interior, Macalisberg, *Sanderson*.—*Kunze*

*Pl. 112-113*  
*Pl. 112-113*

justly remarks of this, "Planta jam habitu notabilis, rachibus flexuosis, pinnis erecto-patentibus stipite brevi rachique primaria validis rufo-paleaceis, colore frondis late viridi et nulli speciei mihi adhuc notæ vere affinis." I may add, too, that it is a species more easily recognized by the eye than by written characters, it is so peculiar in habit.—It is remarkable that the natives of Natal employ the root-stock of this plant as a vermifuge, under the name Umkomo-komo, for destroying the tape-worm, as *N. Filix-mas* is used for similar purposes in England.

113. *N. (Lastrea) Boryanum*, Hook.; "fronds triplicatopinnate, pinnules lanceolate obtuse decurrent, segments truncated obtuse entire, stipes and rachis glabrous."—*Aspidium*, Willd. *Sp. Pl. v. p. 285*. *Lastrea*, Moore. *Aspid. elatum*, Bory, in *Litt. (Willd.)*

Hab. Bourbon, Bory, *Carmichael*, in *Herb. nostr.*—Carmichael's specimen sufficiently accords with Willdenow's very brief character and description, and has a good deal the appearance of a large form of the Cape *N. inaequale*.

114. *N. (Lastrea) splendens*, Hook.; caudex?, stipes 1-2 feet (and probably much more) long  $\frac{1}{2}$ – $\frac{3}{4}$  inch broad especially at the base, more or less clothed with close-pressed deciduous scales dark chestnut-brown or often (as well as the principal rachis) ebeneous-black and polished, frond ample 2-4 feet long coriaceous broad-lanceolate acuminate bipinnate, primary pinnæ 6 inches to more than a foot long  $1\frac{1}{2}$ –2 inches wide subpetiolate oblong finely acuminate and pinnatifid at the very apex, pinnæ sessile oblong-ovate acute or generally broader at the base and subauricled above the rest crenate or lobato-pinnatifid, the lobes short obtuse entire or dentate, veinlets 2-3-furcate, sori 8-14 large conspicuous forming two lines close to the costule, involucre rather large orbicular-reniform coriaceous dark-brown often paler at the margin.—"*Lastrea splendens*, Wall." in Hook. *fil. Ms. Cat. of Ind. Ferns*, n. 267.— $\beta$ , *angustifrons*; smaller, stipes black or testaceous-brown, frond copiously 3-pinnate. *Lastrea angustifrons*, Moore, *Mss.*

Hab. Sikkim-Himalaya, Hooker *fil. et Thomson*. Bhotan, Griffith. Malay Peninsula, Sir Wm. Norris.— $\beta$ . Nepal, Wallich (1821, no number; one of the specimens has a long, black, creeping subterraneous caudex, thicker than a swan's-quill).—This has the look of a very distinct species; and its large and long, very deep, bright-chestnut or ebeneous-black stipites, and the sori contiguous to the costule, would appear to be characteristic. If my var.  $\beta$  be the same, specifically, then it has a strong creeping caudex; and in this, though it is a small form, the stipes is  $2\frac{1}{2}$  feet long, black or pale-brown.

115. *N. (Lastrea) spinulosum*, Desv.; caudex short stout suberect paleaceous, stipites tufted stramineous brown at the base scaly, fronds ovate or oblong-ovate 1-2 feet and more

long bi-tripinnate, primary pinnæ rather distant upper ones from a broad truncated base oblong inferior ones ovate both gradually acuminate, secondary ones and pinnules close-placed ovate or oblong sessile more or less coarsely spinulose-serrate or pinnatifido-serrate, sori chiefly on the upper half of the frond in two rows on each pinnule, involucre entire or fringed with glandular hairs. *Hook. Brit. Ferns*, t. 18.

*a*, *bipinnatum*; scales of the stipes ovato-acuminate brown often paler towards the margin. *Hook. l. c.*—*Aspid. spinulosum*, *Sw. Syn. Fil. p.* 420. *Schk. Fil. p.* 48. t. 48 *b* and *c* (very good.) *Willd. Sp. Pl. v. p.* 252. *Engl. Bot. t.* 1460. *Hook. et Arn. Brit. Fl. ed. 7. p.* 586 (var. *a*). *Asa Gray, Man. of Bot. Illustr. p.* 597. *Chapm. Fl. of S. U. St. p.* 595. *Lastrea*, *Pr. Pappe and Rawson, Syn. Fil. Afr. Austr. p.* 13. *Polystichum spinosum*, *Roth. Lophodium, Newm.*, and *Lophod. glandulosum* and *uliginosum*? *Newm. Lastr. cristata*,  $\gamma$  *spinulosa*, *Moore, Handb. of Brit. Ferns*, p. 115 (this is also quoted under *L. cristata*, as var. *uliginosa*), ed. 3. p. 122.

*$\beta$* , *dilatatum*; scales of the stipes ovato-lanceolate frequently firm dark-brown with a pale margin, fronds generally broad-ovate or subdeltoid tripinnate, involucre often with glandular hairs at the margin. *Hook. Brit. Ferns*, t. 19.—*Aspid. dilatatum*, *Willd. Sp. Pl. v. p.* 263. *Engl. Bot. t.* 1461. *Sw. Syn. Fil. Add. p.* 421. *Hook. et Arn. Brit. Fl. ed. 8. p.* 586. *Lastrea*, *Pr. Moore. Polypod., Hoffm. Aspid. spinulosum*, var. *dilatatum*, *Hook. et Arn. Brit. Fl. ed. 7. p.* 586. *Asa Gray, Man. of Bot. Illustr. p.* 597. *Chapm. Fl. of S. U. States, p.* 595. *Aspid. campylopterum*, *Kze. Lastrea multiflora*, *Newm. Polypodium tanacetifolium*, *Hoffm. (large and very compound.)*

*$\gamma$* , *æmulum*; "fronds triangular or triangular-ovate spreading tripinnate, pinnules concave, pinnulets pinnatifid, the uncronately-serrated lobes curved upwards, scales of the stipes concolorous narrow-lanceolate lacinate or fimbriate contorted, involucre margined with minute sessile glands." *Moore. —Hook. Brit. Ferns*, t. 20. *Polypodium æmulum*, *Sol. in Ait. Hort. Kew, ed. 1. v. iii. p.* 466 (fide *Johnson, in Hook. Kew Gard. Misc. ix. p.* 263). *Aspidium*, *Sw. Syn. Fil. p.* 60. *Willd. Sp. Pl. v. p.* 283. *Ait. Hort. Kew. ed. 2. v. v. p.* 513. *Metten. Aspid. p.* 58. *Lastrea*, *Brack. Fil. U. S. Expl. Exp. p.* 200. *J. Sm. Cat. Kew Ferns*, p. 58. *Moore, Handb. of Brit. Ferns*, ed. 3. p. 139. *Nephrodium Fœnisecii*,

Lowe, *Prim. Faun. et Fil. Mad.* p. 7. Seubert, *Fl. Azor.* p. 16. Lastrea, Wats. Bab. Moore, *Brit. Ferns, nat. print.* t. 27. Lophodium Fœnisecii, recurvum, and concavum, Newm. Aspid. recurvum, Bree. A. dilatatum, Höll. *Fl. of Mad. in Hook. Journ. Bot.* 1834. i. p. 16.

♂, *dumetorum*; "frond doubly pinnate, pinnules pinnatifid, lobes with terminal sharp prickly teeth, common stalk scaly, involucre flat orbicular with a deep notch." Sm. under Aspid. *dumetorum*, *Engl. Fl.* iv. p. 281. N. spinulosum, ♂ *dumetorum*, Hook. *Brit. Ferns*, t. 21. Lastrea *dumetorum*, "T. Moore, MS. in *Herb.* (not L. dilatata, var. *dumetorum*, *Id. Handb. of Brit. Ferns*, p. 124)," accord. to Moore, in *Brit. Ferns, nat. print.* 1855; but the same reference is retained in Moore, *Handb. of Brit. Ferns*, ed. 3. 1857. L. dilatata, var. *dumetorum*, Moore, *Brit. Ferns, nat. print.* t. 25. Aspid. spinulosum, β, Hook. et Arn. *Brit. Fl. ed.* 7. p. 586 (in ed. 8, it is given as a synonym of A. dilatatum). L. dilatata, var. *collina*, and var. *maculata*, Moore. L. *collina*, L. *multiflora*, var. *collina*, and Lophodium *collinum*, Newm. Polypod. *cristatum*, β, Huds. *Angl. ed.* 1. p. 391, fide Sm.

Hab. Almost universal throughout Europe, from the Mediterranean to Sweden and Norway, and eastward through the Russian dominions to Ta-Lien-whan, North China (Col. Uquhart), and to Kamtschatka; and in similar latitudes in North America, from the southern states to the northern lakes of Canada, and across the Rocky mountains to British Columbia. Cape of Good Hope, Drège. Var. γ. Madeira, Azores, England and Ireland and Scotland, in *Herb. nostr.*—Perhaps no group of Ferns has occasioned more difference of opinion than the supposed species I have here brought under the *Aspidium spinulosum* of Sw. Being all natives of Britain, I devoted my best attention, and with large suites of specimens before me, to the consideration of them for publication in my 'British Ferns,' and the results of my present further investigations do not induce me to alter my views.—The var. ♂, *dumetorum*, does bear a great resemblance to some of the more compound or bipinnated forms of N. *Filix-mas*; and a very attentive student of British Ferns, Mr. Clowes (see Hook. British Ferns, under N. *remotum*, t. 22, which I am now disposed to refer to a state of *F.-mas*), concludes his remarks on that Fern, by observing that "as this Fern appears to connect the two forms *Lastrea spinulosa* and L. *Filix-mas*, we have now, it would seem, a continuous series from typical *F.-mas* to L. *dilatata*,—as the latter and *spinulosa* are apparently united by *glandulosa*." I am not prepared at present to adopt this opinion; but founded as it is on close observation on living specimens, it should be a caution to what are called "straw-splitters."

(Variously decomposed, but not polystichoid. Sp. 116–143.)

116. N. (Lastrea) *hirtum*, Hook.; caudex short rounded erect shaggy with long silky ferruginous subulate scales, stipites flexuose wiry 4–6 inches to a span long tufted glandular and paleaceous with brown subulate flexuose scales, fronds

4-6 inches long submembranaceous brownish-green piloso-glandulose triangulari-ovate shortly acuminate bipinnate tri-pinnate below, basal primary pinnæ petiolate half-ovate the rest oblong obtusely acuminate subsessile, secondary pinnæ oblong 1-1½ inch long deeply pinnatifid with obliquely ovate small lobes or segments 1½ line long entire, ultimate pinnules small sub-3-lobed, veinlets simple or forked, sori 1-2 on each small segment or pinnule, involucre small reniformi-cordate membranaceous ciliato-glandulose, rachises and petioles everywhere glandulose and paleaceous with brown crisped hair-like scales.—*Aspidium hirtum*, Sw. *Syn. Fil.* p. 56. *Willd. Sp. Pl.* v. p. 266. *Schk. Fil.* p. 194. t. 46. *B. Metten. Aspid.* p. 114. *Lastrea*, Pr. *Polypod.*, Sw. *Fl. Ind. Occ.* iii. p. 1686. *Cystopteris*, Kl. in *Linnaea*, x. p. 361. *C. rufescens*, Fée, *Gen. Fil.* p. 300. *Polypod. barbatum*, Kze. in *Linnaea*, ix. p. 52. *Polypodium crystallinum*, Kze. in *Schk. Fil.* ii. p. 85. t. 135 (*weak specimens*). *Cystopteris brevinervis*, Fée, *Mém.* vii. p. 65. t. 26. f. 2 (*Metten.*). *Aspid. nemorosum*, *Willd. Sp. Pl.* v. p. 83, according to *Eat. Fil. Wright. et Fendl.* p. 209. *Plum. Fil.* t. 83 (*a very exaggerated figure*).

Hab. Jamaica, Swartz, Purdie, March, Wilson. Cuba, C. Wright, n. 1015, 886, and 1016 (*Aspid. nemorosum*, Eat.), Peppig, Otto, Linden, 1876 and 1877. Mountains of Vara Paz, Guatemala, Salwyn. Tropical West Africa, south of the line (12-15 inches long), *Curror.*—A very peculiar and well-marked species, not to be confounded with any other. My tropical African specimens are very fine, yet in no way otherwise different from the West Indian ones.

117. N. (*Lastrea*) *funestum*, Hook.; caudex long creeping underground, "frond quinquangular tripartite primary divisions ovato-acuminate lateral ones subopposite pinnato-pinnatifid, two lowest exterior pinnæ elongated middle division bipinnate at the base, pinnato-pinnatifid at the apex, pinnules or segments trapezio-ovate-oblong obtuse subfalcate auricled above cuneate and decurrent at the base, crenate incised subpilose beneath, sori near the margin remote, rachises and long stipes (deciduously) setoso-paleaceous." Kze. (TAB. CCLIX).—*Aspidium*, Kze. in *Linnaea*, ix. p. 96. *Metten. Aspid.* p. 71. *Lastrea*, Moore. *Aspidium cicutarium*, *Willd. Sp. Pl.* v. p. 215 (*ex parte, fide Klotzsch*). Kze. *Flora*, 1839. *Beibl.* p. 33. *Klotzsch, in Linnaea*, xx. p. 371.

Hab. South America: particularly abundant in Brazil, Martius, Gardner, Spruce, etc. Guiana, all collectors. Porto Rico, De Schach. Guadeloupe, L'Herminier. Trinidad, Sir Ralph Woodford.—"Species," observes Professor Kunze, "ab omnibus adhuc descriptis distinctissima! Frondis forma *Cistopt. montanæ* æmulat." The author must mean in outline only. In size the frond

is a span to a foot and more long; pinnules from  $\frac{1}{2}$  an inch to an inch long.—It has however some affinity with our *Nephrod. subquinguefidum* from tropical Africa; and I am not sure but future observation may prove them to be identical. Our *N. variabile* is another allied species, but far more compound; and that is a native of tropical America as well as of tropical Africa, and these may possibly all be forms of one and the same species.

118. N. (*Lastrea*) *subquinguefidum*, Hook.; caudex long creeping slightly paleaceous with blackish subulate scales, stipites distant 6–12 inches long slightly paleaceo-pilose at the base only, fronds a span to a foot long and as much broad subcoriaceo-membranaceous blackish-green when dry, glabrous normally cordately five-angled more or less acuminate (or cordate tripartite the lateral divisions with the lowest inferior pinnæ very much elongated) tripinnate, primary superior pinnæ deeply pinnatifid with obovate very obtuse subsinuated segments the lowest pair bipinnate with the basal inferior pinnæ much elongated deflexed and pinnated, veinlets twice or thrice forked, sori small rather distant intermediate between the costule and the margin, involucre very small reniformi-orbicular.— $\alpha$ , *tripinnatum*; five-angled, pinnules numerous subobovate or unequally obovate or subrhomboid obtuse. *Aspid. subquinguefidum*, *Beav. Fl. Owar. et Benin.* i. p. 34. t. 9 (1804). *Willd. Sp. Pl.* v. p. 214. *Metten. Aspid.* p. 71. *Lastrea*, *Pr.* *Aspid. protensum*, *Sw. Syn. Fil.* p. 51 (1806).— $\beta$ , *elongatum*; five-angled subbipinnate, pinnæ and ultimate pinnules generally much elongated and acuminate.— $\gamma$ , *securidiforme*; frequently only tripartite, two inferior angles suppressed, pinnules very large almost uniformly hatchet-shaped.

Hab. Very common in tropical western Africa and islands, from Senegambia (*Brunner*) to the south of the line (*Curror*), *Palisot de Beauvois*, *Afzelius*, *Vogel*, *Irving* (Abeokouta), *Baikie and Barter*, *Mann*.—*Palisot de Beauvois's* figure well represents what may be considered the normal state of this plant; but I possess some remarkable varieties. In  $\beta$ , some of the pinnules are lanceolate, finely acuminate, 3 inches long, entire or scarcely lobed. In  $\gamma$ , the pinnules are almost uniformly 2 inches long,  $\frac{1}{2}$  an inch broad, obtuse, with a truncated base, so as to be almost exactly hatchet-shaped.

119. N. (*Lastrea*) *Vogelii*, Hook.; caudex slender creeping, stipites slender filiform 1–2 inches long pilose rather than paleaceous at the base, fronds 2–4 inches long subtriangularly-ovate acuminate membranaceous pinnate subbipinnate below, pinnæ oblong-lanceolate decurrent at the base lobato-pinnatifid obtuse the lowest pair again subpinnate, veinlets twice or thrice forked, sori on a superior branch of the veinlet nearer

the costule than the margin, involucres reniform delicate membranaceous denticulate at the margin bearing a few long hairs on the surface.—*Aspidium*, *Hook. Ic. Pl. t.* 921 (or *Century of Ferns*, t. 21).

Hab. Fernando Po.—Although this little plant bears copious sori, yet I suspect my rather numerous specimens are only seedlings of some known tropical African species, and I almost think I can trace a passage into *N. subquinguefidum*, near which I consequently place it. The caudex is slender and creeping, as in that species; and it is not unfrequent for the *young* fronds of Ferns to be more or less villous or pubescent, which pubescence is thrown off in maturity.

120. N. (*Lastrea*) *Parishii*, Hook.; caudex creeping (in all the specimens a coating of limestone soil adheres firmly to it and to the descending radicles), stipes solitary lax soft slender glabrous and quite scaleless a little downy at the summit, fronds 4–6 inches long and as much broad pale-green pellucid succulent membranaceous when dry, pubescently hairy on the costæ, pentangular-deltoid acuminate ternately tripinnate pinnatifid at the apex, primary pinnæ oblong-acuminate subopposite deeply nearly to the rachis pinnatifid, inferior ones pinnate at the base and petioled, segments and pinnules  $\frac{1}{2}$ – $\frac{3}{4}$  of an inch long strongly serrated or acutely pinnatifid and all decurrent so as to form a winged rachis, basal pair of primary pinnæ twice or thrice as large as the rest and remote from them half-ovate acuminate, the lowest basal pinnæ much longer than the rest and more compound, veinlets lax distant twice or thrice forked, sori equidistant between the costule and the margin, involucre small rotundato-reniform one of the lobes sometimes a little elongated, rachis fusco-pubescent. (TAB. CCLX.)

Hab. Moulmein, *Rev. C. S. P. Parish*, “an elegant, delicate, succulent, and transparent Fern, most sensitive of drought, only growing in the wettest and shadiest nooks of the limestone rocks during the rains, perishing *immediately* the rains are over,” *Thos. Lobb*.—A most remarkable and very distinct species, with somewhat the habit of *Cistopteris montana* or *Polypodium Dryopteris*, but infinitely more delicate than either.

121. N. (*Lastrea*) *membranifolium*, Pr.; caudex a thick erect rhizome with black subulate scales, stipites tufted a span to a foot long often squamose with similar scales, fronds 1–2–3 feet or more long firm-membranaceous dark-green deltoid ovate somewhat five-angled acuminate, primary pinnæ 3–6 inches long  $1\frac{1}{2}$ –2 inches broad middle ones sessile deeply pinnatifid uppermost ones coadunate into a deeply pinnatifid apex with more or less entire segments lower ones more



compound and petiolate, lowest pair the largest half-ovate acuminate, their lowest basal pinnæ the longest and deflexed, secondary pinnæ and pinnules resembling the middle pinnæ similarly pinnatifid with oblong subacute and slightly falcate large spreading lobes often an inch long and  $\frac{1}{4}$  of an inch wide, veins pinnated all free rarely a few irregularly anastomosing, veinlets simple or forked, sori in general forming a single series close to and chiefly upon the lobes or segments rarely on the disk and then scattered, involucre rather small reniformi-cordate (some appear to be orbicular and peltate). (TAB. CCLXI.)—*Pr. Reliq. Hænk. p. 36. t. 5. f. 3 (small, but accurate).* *Aspidium, Metten. Aspid. p. 113.* *Lastrea, Pr. Tent. Pterid. p. 76. J. Sm. in Hook. Bot. Journ. iii. p. 412.* *Aspidium fuscipes, Wall. Cat. n. 361 (1827).* *Aspid. sagenioides, Metten. Aspid. p. 269.*

Hab. Malay Peninsula and Archipelago: Tenasserim, *Wallich*; Moulmein, *Parish*, n. 144; Malay Islands, *Hænke*, n. 36, 249, and 354, *Falconer*; Chittagong, *Hooker fil. and Thomson*, n. 224 d; Assam, Khasya, Boutan, Sylhet, *Griffith, Hooker fil. and Thomson*; Nilghiri, *Beddome*, n. 119, *Simons, Booth*; Ceylon, very abundant, *Mrs. Genl. Walker, Gardner*, 1357.—It is remarkable that this plant, apparently common in Eastern India, distributed by Dr. Wallich, under the name here adopted, thirty-five years ago, should be so little known to botanists. It is assuredly the *N. membranifolia* of Presl, and equally, I think, the *Aspid. sagenioides*, Metten. Its habit is indeed so completely that of the *Sagenia*-group of *Euaspidium*, that it may have been mistaken for some of the forms of *Aspidium cicutarium* (no. 61 of our *Aspidium*, p. 48, or of the next following, *A. giganteum*, under which I have briefly noticed the present one, and which I then supposed might have been referable to *A. Gardnerianum*, Mettenius. It does not, however, sufficiently accord with that author's description). If the nature of the venation is at all to be depended upon, this Fern must be referred to the lastreoid section of *Nephrodium*, rather than to the sagenioid-group of *Aspidium*.

122. N. (*Lastrea*) *purpurascens*, Hook.; caudex short erect stout densely rooting below, paleaceous with copious ovate acuminate scales above, stipites tufted a span to 1–2 feet long more or less scaly as is the rachis, fronds 1–1½ foot long subcoriaceous ovate acuminate bi-tripinnate, primary pinnæ 3–5–6 inches long distant much petiolate ovate or oblong-acuminate, secondary ones ovate or ovato-oblong obtuse petiolate those above the middle of the frond subobliquely rhomboid cuneate at the base all more or less pinnatifid especially in the lower half with rounded obtuse entire lobes, superior basal segment generally the largest hence subauriculate, ultimate pinnules (when tripinnate) of the same character, veinlets simple or mostly forked, sori rather irregular nearer the costule than the margin, involucre rather large

persistent orbiculari-reniform plane brown almost black in the disk. (TAB. CCLXII.)—*Aspid. purpurascens*, *Bl. En. Fil. Jav.* p. 169. *Aspid. densum*, *Wall. Cat.* n. 390. *Metten. Aspid.* p. 65. *Lastrea*, *Pr. Aspidium nitidulum*, *Wall. Cat.* n. 392. *Aspid. Weiglianum*, *Kze. in Linnæa*, xxiv. p. 284, and *A. catophoron*, *Kze. Bot. Zeit.* vi. p. 262 (according to *Mettenius*). *Aspid. sparsum*, *Spr. Nephrod.*, *Don*.

Hab. East Indies, almost universal in mountain districts: Nepal and North-west Bengal, and throughout the Himalaya-range to Khasya and Assam, *Wallich*, *Griffith*, *Hooker fil. and Thomson*, *Simons*, *Thos. Lobb*; Mahalabeshwar, *Bates*; Nilghiri, *Beddome*, n. 120 and 72. Ceylon, abundant, *Gardner*, n. 263 a, 1148, 1369, 1253, 1097, 1370. Mauritius, *Wallich*, 1820. Java, *Blume* (*Aspid. scytodes*, *Bl. in Herb. nostr.*), *De Vriese and Teijsmann*, n. 268, *Thos. Lobb*, n. 272 b. —A rather coarse-looking species, with much of the habit of the less coriaceous forms of *Aspid.* (*Polyst.*) *coriaceum*, much more easily recognized by the eye than by any specific character, varying much in composition and in the length and breadth of the pinnules.

123. N. (*Lastrea*) *flaccidum*, *Hook.*; caudex short erect sending down a dense mass of fibrous roots, stipites tufted stramineous black at the very base slender scarcely scaly a span to a foot long, fronds 1–1½ foot long broad-lanceolate acuminate membranaceous pubescenti-hirsute with long white hairs on the costæ and costules beneath, bipinnate pinatifid at the apex, primary pinnæ remote opposite or alternate 3–4 inches long ½–¾ inch wide sessile lanceolate acuminate, pinnules horizontally patent oblong-lanceolate distant decurrent at the base forming a winged rachis, obtuse or acute lobato-pinnatifid, the segments short entire, veinlets once or twice forked, sori in two rows between the costule and the margin, involucre small pale-coloured orbiculari-reniform depressed in the centre, rachis and costæ stramineous shining. (TAB. CCLXIII.)—*Aspidium*, *Bl. En. Fil. Jav.* p. 161. "*Lastrea remissa*," *Moore, in Herb. nostr.*

Hab. Java, *Blume (in Herb. Nostr.)*, *Millett*. Moulmein, *Parish*, n. 159. Khasya, Kunawar, *Griffith*, *Hooker fil. and Thomson*.—A distinct enough species, as may be seen by our figure, yet, though apparently common in India, very little noticed in books. Authors often misled by comparing a new species with an old one with which it has no similarity, as in this case, where *Blume* alludes to its affinity with *N. Filix-mas*.

124. N. (*Lastrea*) *divisum*, *Hook.*; caudex?, stipes 2–3 feet long nearly ½ an inch or more in diameter brown glossy scaleless, frond ample 3 and probably more feet long triangular-ovate firm-membranaceous glabrous (or a little pubescent on the costæ), primary pinnæ very distant long petioled

below broad-oblong acuminate varying in length from 3-4 inches above to  $1\frac{1}{2}$  foot in the lowest or basal pair their rachises stramineous glossy singularly and broadly winged towards the apex and decurrent till the wing gradually disappears, secondary ones also distant subsessile 2-3-4 inches long broad-lanceolate often finely acuminate, pinnules oblong  $\frac{1}{2}$ - $\frac{3}{4}$  inch long horizontal lobato-pinnatifid with entire short segments approximate with very narrow acute sinuses (in this case the secondary pinnæ may be said to be pinnatifid) but more frequently they are distant with a broad sinus and are all united by a wing on each side the costæ analogous to the wing at the extremity of the main rachises, veinlets simple or forked, sori in two series between the costule and the margin, involucre orbicular-reniform.—*Aspidium divisum*, *Wall. Cat. n. 393.* *Lastrea*, *Moore.*

Hab. Nepal, *Dr. Wallich, Hooker fil.* (alt. 4000-6000 feet). Simla, Kamaon, to Boutan (*Griffith*), Assam, and Khasya (alt. 5000 feet), *Hooker fil. and Thomson, Strachey and Winterbottom, Col. Bates, Edgeworth* (North-west India). Anamally Hills, Madras Presidency, *Beddome, n. 175.*—This is, as far as I know, quite an undescribed species, nor have I ever received a named specimen; but it is, according to Mr. Moore, the *Aspid. divisum* of Dr. Wallich's catalogue. It is indeed very distinct as a species, and must, judging from the specimens in my herbarium, attain a very large size. In structure, and in the winged rachis, the secondary pinnæ very much resemble the pinnæ of *N. flaccidum*; but that is small and slender, and only bipinnate, and wants the decurrent wing towards the apex of the main rachis. Although I have not seen a perfect caudex, one of my specimens has a stipes which throws out stoloniferous wiry roots, like those of *Nephrolepis*.

125. N. (*Lastrea villosum*, Pr.; caudex?, stipites 4-6 feet long (8-10, *Wilson*) 3 inches broad (*Plum.*) copiously sublato-paleaceous, fronds most ample 12 feet long (*Purdie, 16-18, Wilson*) firm-membranaceous more or less villous or pubescent especially on the costæ often glandular beneath tripinnate, primary pinnæ distant from a span (near the apex) to 2-6 feet long (in my herbarium) petiolate broad oblong-lanceolate acuminate, secondary pinnæ very numerous approximate 2-6-8 inches long  $1\frac{1}{2}$  inch wide sessile oblong finely acuminate deeply almost to the rachis pectinato-pinnatifid or below quite pinnate, segments nearly horizontal approximate  $\frac{1}{2}$ - $\frac{3}{4}$  of an inch long obtuse entire or crenate or more or less deeply lobato-pinnatifid the lobes entire, veinlets simple or forked, sori copious in two series on each pinnule or large segment between the costule and the margin one to each lobule, involucre large plane persistent orbicular with a very obscure sinus (apparently often quite peltate), rachises pubes-

centi-hirsute. (TAB. CCLXIV.)—*Aspidium*, *Sw. Syn. Fil.* p. 56. *Willd. Sp. Pl.* v. p. 271. *Schk. Fil.* p. 194. t. 46. b. *Metten. Aspid.* p. 115. *Lastrea*, *Pr. Polypod.*, *Linn.—Plum. Fil.* t. 27.

Hab. West Indies: Jamaica, *Swartz*, *Bancroft*, *Alexander*, *Purdie*, *March*, *Wilson*, alt. 4000 feet; New Granada, *Linden*, n. 843; Ecuador, foot of Chimborazo, alt. 4000 feet, *Spruce*.

126. N. (*Lastrea*) *Blumei*, Hook.; "frond bipinnate membranaceous puberulous on both sides the costæ, inferior pinnæ petiolate deeply bipinnatifid superior ones adnate confluent pinnatifid, pinnules sessile oblong rather obtuse incisoserate or entire exterior ones (lowest pinnæ) oblong deeply pinnatifid, sori scattered, rachis and stipes paleaceo-hirsute." *Bl.*—*Aspidium intermedium*, *Bl. En. Fil. Jav.* p. 161 (*not of others*). *Lastrea Blumei*, *Moore*. *Lastrea propinqua*, *J. Sm. in Hook. Journ. Bot.* iii. p. 412 (*in part*). *Metten. Aspid.* p. 115. *Presl, Epimel.* p. 38 (*in part*).

Hab. Java, *Blume* (*in Herb. nostr.*), *Thos. Lobb*. Luzon, *Cuming*, n. 80 and 151 (*quite young*). Bonin Isles, a much larger and more compound state, *C. Wright*, and from *Herb. Imp. Acad. Petersb.* n. 36. Ceylon?, *Gardner*, n. 1280, *Thuaites*, *C. P.* n. 3142. Sikkim, alt. 1000 feet, *Hooker fil. and Thomson?*—*J. Smith* and *Presl* refer to their *Lastrea propinqua*, nos. 255, 252, 151, and 80; I confine my references to the two latter. No. 252 is a *Microlepia*, and n. 255 is undoubtedly *N. membranifolia*, *Presl*, who himself remarks, "affinis quodammodo *L. membranifolia*," which can only be said of 255. The specimen of *Aspid. intermedium*, *Blume*, in my herbarium, Mr. Moore ascertained to be identical with this, and *Blume* observes, "*F. mas*, Sw., diversum laciniis serrulatis pinnisque inferioribus haud bipinnatifidis." Our specimens from Bonin are much larger and more compound, and Mr. C. Wright's (*Lastrea propinqua*, *J. Sm.*), as well as our n. 151 of Mr. *Cuming*, have the base of the long stout stipes clothed with very long erect setaceous bristles,  $\frac{3}{4}$  of an inch long. It is clearly a variable Fern, which requires a good suite of specimens in order to define the species accurately. Great injury is done to this department of botany, above all others, by hastily describing from imperfect individuals.

127. N. (*Lastrea*) *recedens*, Hook.; caudex (of a very young specimen) a short thick ascending rhizome paleaceous with subulate ferruginous scales, stipites tufted a span to a foot long rather slender very scaly at the base the rest and the rachises rather densely fusco-pubescent, fronds a foot long and equally broad at the base firm-membranaceous deltoid more or less pubescent on both sides subglandulose beneath, bi- below tripinnate, primary pinnæ broad-oblong acuminate petiolate patent (but not horizontal) from 3–6–8 inches long the basal ones much the largest  $2\frac{1}{2}$  inches broad, secondary ones oblong sessile and decurrent at the base so as to form a

narrow wing to the rachis oblong an inch and more long very acute coarsely and very acutely almost pungently serrate or pinnatifid, veinlets simple or once or twice forked, sori generally one or two to each tooth or lobule of the pinnule. (TAB. CCLXV.)—Polypodium, *J. Sm. En. Fil. Philipp.* in *Hook. Journ. Bot.* iii. p. 394. *Lastrea*; *Cat. of Gard. Ferns*, p. 57. *Metten. Aspid.* p. 114. *Lastrea elegans*, "*Moore, En. of Cult. Ferns.*" *J. Sm. Cat. Gard. Ferns*, p. 57 (according to *Mr. Moore*).

Hab. Philippine Islands, *Cuming*, n. 96. Java, *De Vriese and Teijsmann*. Ceylon, *Gardner*, 1374, 1110 (some specimens 2 feet and more long, copiously tripinnate). Tonglo, Moulmein?, *Parish*, n. 98 (rachises and fronds glabrous, pinnules less decurrent). Nilgherries, *Sir F. Adam*. Dindygul, *Wight* (2–3 feet long). Sikkim-Himalaya and Simla, *Hook. fil. and Thomson*, n. 264 a? (larger, rachises which bear the pinnules more broadly winged, stipites and main rachises quite glabrous.—Fern-botany is unfortunately overwhelmed with published names of gardens ("Hortulanorum") and of private herbaria, which are largely circulated, unaccompanied by description or specific character. The labour of all that is left to others, while their names are expected to be adopted. Happily in the present case, we can refer to the original authority for the plant, in *Mr. Cuming's* n. 26, from Luzon, from which I have drawn up my character. *Lastrea elegans* is a Fern of Moore and Houlston, which *Mr. Moore* himself now refers to *J. Smith's L. recedens*. I believe my Ceylon specimens to be identical with those from Luzon, but I am doubtful of those from Simla and Sikkim, and from Moulmein; they seem to pass into other forms, which I cannot venture to name satisfactorily.

128. N. (*Lastrea*) *furcatum*, Hook.; "frond tripinnatifid (tripinnate), rachises and stipes brown evanescently puberulous furrowed above densely clothed with small lanceolate acuminate scales, pinnæ bi- or tripinnatifid (tripinnate?) petiolate oblong subobtusely patent the lower ones auricled, pinnules pinnatifid or bipinnatifid (bipinnate?) oblong subcordate at the base obtuse decurrent towards the apex, segments oblong obtuse pinnatifid serrated repand or entire, involucre reniform glabrous brown." *Kl.*—*Aspidium*, *Kl. in Linnæa*, xx. p. 371. *Lastrea*, *Moore*.

Hab. Tropical America: Columbia, *Moritz*, n. 37 (*Kl.*), *Linden*, n. 124, 177, and 1020; Panama, *Cuming*, n. 1300, *S. Hayes*, n. 376; Organ Mountains, Brazil, *Gardner*, n. 189; Tarapota, Eastern Peru, *Spruce*, n. 3942; foot of Chimborazo, alt. 3000 feet, *Spruce*, n. 5716?—I possess an authentic specimen of this species, which enables me to give other stations besides that of *Moritz*. If I am correct in referring *Spruce's* two Ferns and *Mr. S. Hayes's* n. 376 (which I have no reason to doubt) here, the base of the stipites is for several inches clothed with a very dense mass of ferruginous long silky wool, and the pinnæ and pinnules vary much in size, especially in breadth.

129. N. (*Lastrea*) *oppositum*, Hook.; caudex?, stipes and main rachis pubescent and paleaceous with rather sparse

spreading linear-subulate brown scales 2-3 lines long, frond broad triangular-ovate 1-1½ foot long coriaceous-membranaceous glabrous (except on the secondary rachises and costæ, which are downy) bipinnate, primary pinnæ petiolate 6-9 inches long 2-3 inches broad moderately acuminate, lowest pair subopposite, pinnules sessile 1-1½ inch long oblong acute deeply nearly to the rachis pinnatifid, segments approximate obtuse a little falcate entire, veinlets simple or forked, sori 3-4 on each side the costule between it and the rachis, involucre small membranaceous brown reniformi-cordate. (TAB. CCLXVI.)—*Aspidium oppositum*, *Kauf. in Spreng. Syst. Veget.* iv. p. 108. *Metten. Aspid.* p. 115. *Lastrea*, *Pr.*

Hab. Mauritius, *Sieber, Syn. Fil. n.* 36. Bourbon (*Mettenius*). Cape of Good Hope (*Sprengel*).—I have drawn up my character from *Sieber's* specimen, *n.* 36 of his 'Synops. Filicum,' from Mauritius, and which sufficiently accords with *Kaulfuss's* character in *Sprengel*. *Pappe* and *Rawson* do not acknowledge it as a Cape species. The firm, narrow, linear, paleaceous scales of the stipes and main rachis are remarkable; their presence and the entire segments of the pinnules, and the absence of long hairs, readily distinguish the species from *N. catopterum*.

130. *N. (Lastrea) catopterum*, *Hook.*; stipes 3-4 feet long dark-brown below, stramineous above destitute of scales, frond ample 3 feet and more long subtriangulari-ovate firm-membranaceous pubescenti-hirsute beneath and even villous especially on the costules and veins tripinnate, primary pinnæ petiolate oblong or broad-lanceolate acuminate all petiolate, the lowest ones 1½-2 feet long, their secondary pinnæ also petiolate, pinnules sessile oblong 1-2 inches long obtuse or subacuminate, the segments entire or more frequently deeply and bluntly serrated or subpinnatifid or even again subpinnate, veinlets simple or rarely forked, sori rather small generally one to each of the lesser segments, involucre dark-brown membranaceous cordato-reniform.—*Aspidium*, *Kze. in Linnæa*, x. p. 550 (*who quotes* "*A. odoratum*, *Sieb. Fl. Maurit. nec Willd.*"). *Lastrea*, *Pappe and Rawson, En. Fil. Cap.* p. 12. *A. odoratum*, *Metten. Aspid.* p. 115, *who considers it true odoratum of Willd. Sp. Pl. v. p. 286.* (*Moore refers the A. catopterum to A. lanuginosum, Willd.*)

Hab. South Africa, chiefly in the eastern districts of the Cape Colony, *Drège, Bowie, Major Garden*. Mauritius, *Sieber, Syn. Fil. n.* 48. West Tropical Africa: Island of St. Thomas and Fernando Po, on Clarence Peak, alt. 5000 feet, *G. Mann*. South of the line, *Cuvrier* (pinnules large).—Var. *glabra*; pinnules distant on winged rachises. Fernando Po, *G. Mann*. Madagascar, *Boivin*.—Var.? *minor*; pinnules thrice larger. Prince's Island, West Coast Tropical America, *Barter, n.* 1906.—I am a little doubtful about the last-mentioned tropical African localities, but we must allow for considerable variation, as in other Ferns.

131. *N. (Lastrea) latifrons*, Hook. ; caudex ?, stipes a span and probably much more long deciduously scaly, fronds 2–3 feet long firm-membranaceous dark-brown when dry, beneath minutely glandular, ovate pinnate upwards bipinnate below, lower primary pinnæ petiolate a span to a foot long lowest pair semiovate, pinnæ above sessile oblong moderately acuminate deeply pinnatifid, segments oblong subfalcate, pinnules of the inferior primary pinnæ  $1\frac{1}{2}$ –3 inches long sessile their bases often decurrent and as well as the pinnules oblong pinnatifid, veinlets simple or forked, sori submarginal, involucre large membranaceous entire, rachis and costæ beneath pubescent and paleaceous with soft ferruginous lanceolate scales.—*Aspidium*, *Brack. Fil. U. S. Expl. Exp.* p. 196.

Hab. Oahu, Sandwich Islands, *Brackenridge* (high mountains behind Honolulu), *Douglas*, *Seemann*.—Readily distinguished by the large size of its pinnules and of the lobes of the pinnæ.

132. *N. (Lastrea) Mexicanum*, Hook.; caudex a short thick erect rhizome densely clothed with soft ferruginous linear-lanceolate scales, stipites tufted a span to  $1-1\frac{1}{2}$  foot long stramineous laxly scaly at the base, fronds subcoriaceo-membranaceous pale-green glabrous a span to  $1-1\frac{1}{2}$  foot long broad oblong-lanceolate acuminate bi- below tripinnate, primary pinnæ petioled rather distant from an obliquely cuneate base broad-lanceolate their upper half pinnatifid pinnate towards the base the lowermost mostly bipinnate towards their base, segments and pinnules obliquely obovate or rhomboid subacuminate or oblong obtuse often spatulate entire or more or less deeply pinnatifid subauricled the base tapering and more or less decurrent and confluent, veinlets once or twice forked, sori few distant small rather nearer the margin than to the costæ, involucre when young a white orbicular membrane with a brown spot in the centre when older more coriaceous reniform or subhippocrepiform. (TAB. CCLXVII.)—*Pr. Reliq. Hænk.* i. p. 38. *Kze. in Linnæa*, xiii. p. 37. *Metten. Aspid.* p. 64. *Lastrea*, *Pr. Aspid. paupertinum*, *Ræm. Kze. in Linnæa*, xviii. p. 341. *Lastrea*, *Lieb. Fil. Mex.* p. 120. *Polypodium angustifrons*?, *Kze. in Linnæa*, xiii. p. 134. *Aspid. leptorachis*, *Kze. in Linnæa*, xviii. p. 341. *Lastrea*, *Lieb. Fil. Mex.* p. 120.

Hab. Mexico, *Hænke*, *Liebm.* (L. leptorachis, *Lieb. in Herb. nostr.*), *Seemann*. *Realejo*, *Beechey*. Andes of Ecuador, *Spruce*, n. 5292. Venezuela, *Fendler*, n. 168, 169. New Granada, *Schlim*, n. 54, 622. Panama, *Seemann*, *Sutton Hayes*, n. 577. Jamaica, *Purdie*, *Wilson*.—A very variable species in the form and di-

vision of the pinnæ, pinnules, and segments. Mettenius has distinguished three varieties as *obtusilobum*, *serratum*, and *acutilobum*; but these three forms, and others, too, may be seen on one and the same frond.

133. N. (Lastrea) *sphærocarpum*, Hook.; caudex?, stipites slender 4–5 inches long laxly paleaceous with large scales at the base stramineous as well as the main rachis and glossy, fronds ovato-lanceolate rarely subdeltoid acuminate a span to a foot long membranaceous uniformly tripinnate, primary pinnæ distant petiolate 3–4 inches long from a broad base oblong acuminate, secondary pinnæ also shortly petiolate ovato-oblong bluntly acuminate distant  $\frac{1}{2}$  an inch to 1 inch long rarely more, deeply pinnatifid in the upper half pinnated below, segments or pinnules 2–3 lines long oblong contracted at the base entire or sublobato-serrate, serratures acute, veinlets forked, sori general one at the base of each lobe or pinnule, involucre large cordato-reniform at first plane at length very convex with a deep sinus, one of the lobes sometimes elongated.—*Athyrium sphærocarpum*, Fée, *Gen. Fil. p.* 186. *Moore, Ind. Fil. p.* 188. *Aspid. athyroides*, Mart. et Gal. *Fil. Mex. p.* 67. *t.* 18. *Lastrea*, Liebm. *Fil. Mex. p.* 122.—Var. *glandulosum*; frond larger subdeltoid punctato-glandulose beneath. *Lastrea Mexicana*, Liebm. in *Herb. nostr.*

Hab. Mexico, Galeotti, n. 6425, Coulter, n. 1699 and 1710.—Var. *glandulosum*; Mexico (Lastr. Mexicana, Liebm. in *Herb. nostr.*).—Different as are the specimens of Galeotti and Coulter from *N. Mexicanum*, I am far from feeling sure that this Fern is not one of the many forms of that variable species. Liebmann, who seems to know Galeotti's plant, has, according to my views, taken a broad-fronded and glandulose var. of this for true *Mexicana*. It is evidently of the same group with that, and the involucre is of the same nature.

134. N. (Lastrea) *deparioides*, Hook.; stipes slender 1–1 $\frac{1}{2}$  foot long very paleaceous below with large lanceolato-subulate brown scales, frond 2 feet long ovato-acuminate membranaceous glabrous bipinnate, primary pinnæ 4–5 inches long broad-lanceolate petiolate acuminate, pinnules about an inch long rather distant obliquely rhombico-ovate acuminate laciniato-pinnatifid unequally cuneate at the base and there subauricled above, the segments or teeth each bearing a solitary sorus at the very extremity terminating a veinlet, involucre larger than the tooth which bears it convex cordiform with a deep sinus.—*Hook. Fil. Exot. t.* 3. *Diclisodon deparioides*, *Moore, Ind. Fil. p.* xcv. and 316.

Hab. Ceylon, Thwaites, C. P. n. 3062. Anamally Hills, S. Penins. of India,



*Beddome* (Moore).—I willingly adopt Mr. Moore's specific name for this rare and very interesting Fern, but I do not at all concur in his views of its place in the system, viz. among the *Dicksonia*-tribe.

135. *N. (Lastrea) variabile*, Hook.; caudex a stout creeping underground rhizome scaly in the younger portions, stipites more or less approximate from a span to 2 feet long brown subglandularly crispato-pilose as are all the rachises and costæ (the rest glabrous), fronds rather membranaceous than coriaceous olive-green or black when dry deltoid acuminate or rather five-angled in circumscription from a span to 2 feet long tri-quadripinnate or supradecomposed, lowest primary pair of pinnæ very large and their basal inferior secondary pinnæ much elongated and deflected, tertiary pinnæ oblong more or less wide in proportion to the length obliquely cuneate and decurrent at the base pinnatifid or pinnulated, ultimate pinnules obliquely subovate or in the most compound fronds spatulate, in all the tertiary divisions the inferior half is narrower and less deeply divided than the superior, costules of the ultimate pinnules excentric, veinlets forked, sori generally one to each lobule or segment sometimes small and appearing to be destitute of involucre at other times large with a small membranaceous involucre or with a very conspicuous firm involucre flat quite orbicular or with a very small sinus not extending to the point of attachment.—Two forms of this are deserving of notice: var. *α*, *normale*, with the ultimate pinnules  $\frac{1}{2}$  an inch long obliquely subrhomboid; and *β*, *Barteri*, very decomposed, ultimate pinnules about two lines long subspatulate. But I possess several intermediate grades.

Hab. Tropical Western Africa and Islands, north and south of the line, *Ansell*, *Barter*, *Curror*, *G. Mann* (Gaboon River; large, the stipes very stout, chestnut-colour, quite glabrous). Tropical East Coast of Africa, Isle of Nissobé, *Boivin*. British Guiana, *Appun*, n. 178. São Gabriel, Amazon, *Spruce*, n. 2129.—Var. *β*. Prince's Island, West Africa, *Barter*.—The mode of growth, and outline or circumscription, resembles *N. subquingefidum*; but the fronds attain a much larger size, are much more compound, even supradecomposed, and the ultimate pinnules small. The specimens from tropical America differ in no respect from those of Africa.

136. *N. (Lastrea) squamisetum*, Hook.; caudex short thick erect or nearly so very paleaceous with ferruginous rather linear scales, stipites tufted firm terete stramineous glossy a span to a foot long scaly as is the caudex at the base, the rest and the rachises and costules sparingly setose with subulate ferruginous firm spreading persistent scales, fronds a span to

14 inches long ovate acuminate subcoriaceo-membranaceous palish-green when dry, tripinnate, primary pinnæ 4-6 inches long petiolate two lowest pairs semiovate (the lower half the broadest) acuminate the rest oblong acuminate pinnatifid at their apices with oblong entire segments, pinnules obovate or oblong obtuse obliquely cuneate and subdecurent scarcely  $\frac{1}{2}$  an inch long subpinnatifid on the superior margin, costules and veinlets subflexuose the latter forked, sori generally one to each lobe or segment near the costule, involucre very conspicuous exactly cordato-reniform subconvex with a rather deep sinus. (TAB. CCLXVIII.)

Hab. Clarence Peak, Fernando Po, alt. 4000 feet, *Gustav Mann*.—With much of the habit and shape of segments and ultimate pinnules resembling the smaller and least compound state of our *N. variable*, this is in reality very distinct. The caudex is a stout, nearly erect rhizome, with copious paleaceous scales; stipites crowded, tufted, all, except the base, together with the rachises, stramineous and quite setose, with firm, small, subulate, spreading, ferruginous scales. The involucre, too, are quite different.

137. *N. (Lastrea) eriocarpum*, Decaisne; caudex ascending stout clothed with a very dense cushion-like mass 1-3 inches thick of aureous subulate scales from  $\frac{1}{2}$ -1 inch long not extending to the stipes, stipites a span to a foot long pale-brown glossy quite glabrous and scaleless as are the main rachises, frond firm-membranaceous pale-green  $\frac{1}{2}$ -1 $\frac{1}{2}$  foot long subquinquefidly deltoid acuminate very pilose on all the costæ and costules on both sides and on the veins beneath with white hairs tripinnate, primary pinnæ oblong or ovate acuminate 4 inches to a span long petiolate lowest pair especially on petioles or branches 2-3 inches long semiovate the lowest basal secondary pinnæ the longest, pinnules oblong-ovate  $\frac{1}{4}$ -1 inch long obtuse deeply pinnatifid decurrent at the base, the segments oblong-ovate toothed or subinciso-pinnatifid, veinlets forked, sori most copious, involucre large pale-coloured membranaceous cordato-reniform convex very villous.—*Aspidium*, *Wall. Cat.* p. 324. *Metten. Aspid.* p. 60. *Nephrod.*, *Decaisne, Archiv. Mus.* ii. p. 185. *Lastrea*, *Pr. Nephrod. hirsutum*, *Don, Prodr. Nep.* p. 6. *Lastrea*, *Moore. Hypodematium onustum*, *Kze. in Flor.* 1833. p. 689. *Analect. Pterid.* p. 45. t. 28. *Aspid. pilosulum*, *Wall. Cat.* n. 337 (not *Kze.*). *A. subdiaphanum*, *Wall. Cat.* n. 343. *Hypodematium Ruppellianum*, *Kze. in Schk. Fil. Suppl.* t. 21. *Cystopteris odorata*, *Pr. Tent. Pterid.* p. 93.

Hab. India, probably very general in the mountain ranges: North-west Ben-

gal, Kamoun, Simla, etc., *Wallich, Strachey and Winterbottom, Bates, Jacquemont*; Sikkim-Himalaya, *Hook. fil. and Thomson, Griffith*; Mahalablashwar, *Bates*; Moulmein, elev. 2000 feet, *Parish*; Irawaddy, *Wallich*. Abyssinia, *Schimper*. Cape de Verdes, abundant, *Miller, J. D. Hooker, Forbes, Vogel, Milne, and Macgillivray*.—One of the best marked of all the genus.

138. N. (*Lastrea*) *tenericaule*, Hook.; caudex ("repent" according to Mettenius) a short erect rhizome, according to one of my specimens, clothed with copious subulate long ferruginous scales above, stipites tufted (?) stramineous or pale-brown varying exceedingly in length and thickness from one foot and slender to 2-3 feet long and  $\frac{1}{2}$  a line to 1 inch in diameter near the base where it is paleaceous as is the caudex, the rest (and the rachis) smooth and polished or glaucous or more or less subulate- or setaceo-paleaceous so as to be hispid with soft long spreading bristles, frond generally very ample 1-3-4 feet or more long broad-ovate (?) acuminate firm-membranaceous 3-4-pinnate, costæ costules and veins hirsute with long white soft silky spreading hairs, pinnæ on long petioles (especially in the more compound fronds) broad-oblong acuminate wide apart, ultimate pinnules oblong or lanceolate more or less decurrent at the base acuminate or obtuse pinnatifid with copious small oblong entire segments, the margin often reflexed, veinlets simple or forked generally bearing one sorus on each small lobe or segment, involucre very small cordato-reniform membranaceous soon disappearing. (TAB. COLXIX.)—*Polypodium tenericaule*, *Wall. Cat. n. 335. Hook. Fil. Hongkong. in Kew Gard. Misc. ix. p. 353. Lastrea*, *Moore. P. trichodes*, *Reimw. J. Sm. Hook. Bot. Journ. iii. p. 394. Phegopteris*, *J. Sm. in Seem. Bot. of the Herald. p. 425. Aspid. uliginosum*, *Kze. in Linnea, xx. p. 6. Bot. Zeit. vi. p. 263. Metten. Fil. Hort. Lips. p. 94. Aspid. p. 72. Hypolepis*, *Fée, Gen. p. 146? (Metten.)*. *Lastrea leucolepis*, *Pr. Epim. p. 39. Polypod. ornatum*, *Wall. Cat. p. 327. Hook. Kew Gard. Misc. ix. p. 354 (in note). Phegopteris*, *Fée, Gen. p. 243. Cheilanthes stenophylla*, *Kze. Bot. Zeit. vi. p. 212 (Metten.)*. *Hypolepis*, *Moore, Ind. xxxix.*

Hab. Apparently common in all parts of the continent of India to Assam and Mishmee and throughout the Malay Islands, all collectors, most abundant in mountain-districts, *Wallich, Griffith, Hooker fil. and Thomson, etc.* Java, *De Vriese and Teijsmann, n. 582* (caudex and main rachis very stout and quite erinaceous with stout setaceous squamæ), 80, 213, 58, 582, 201, 208. Borneo, *Motley, De Vriese, n. 22. Philippine Islands, Cuming, n. 1, 75, 114, 212, 353, 412. Ceylon, Gardner, Thwaites*, who sends specimens with distinct involucre. Society Islands,

*Nightingale, Bidwill.* Otaroka Island, *Cuning*, n. 1417. China, *Fortune*, n. 100, *Alexander*. Kakeah Island (Chinese seas?), *Herb. of U. S. North Pacif. Expl. Exp., C. Wright.* Hongkong, *Wilford, Uryuhart*; Western Provinces of China, *Col. Saul.*—A really good species, I believe, but very difficult to describe satisfactorily, it is so variable, and has hence given rise to many different names. I should have preferred that of Reinwardt, though it has never been described under that name, for the long white silky hairs on the under side of the frond are very peculiar, yet not constant, any more than the large and coarse setæ on the stipites and rachises on some forms; this character is very fallacious. The presence of copious setæ on some specimens of the *Polypod. ornatum*, Wall., mainly induced me to maintain and characterize that species in the Ferns of Hongkong, l. c., but I am now satisfied that the two are one. Very frequently in drying, the margins of the segments of the pinnules are involute, and have probably induced some botanist to place the genus in *Cheilanthes* and *Hypolepis*.

139. N. (*Lastrea*) *rubiginosum*, Hook.; caudex?, stipes a span long paleaceous with large lanceolate ferruginous scales at the thickened base, the rest with the stipes and rachises coarsely ferrugineo-hirsute, fronds 1-1½ foot long subcoriaceous-membranaceous brownish when dry, broadly ovate or subdeltoid acuminate bipinnate above tripinnate below, primary pinnæ 4-6 inches long the basal ones petiolate broad-ovate or half-ovate acuminate the inferior side the broadest especially at the base, superior primary pinnæ sessile oblong-acuminate, pinnules oblong-lanceolate deeply pinnatifid or again pinnate with the segments or pinnules oblong-ovate ciliate glabrous at the margins 2-4 lines long entire or lobato-pinnatifid, veinlets remote simple, sori dorsal near the middle of the veinlet, involucre orbiculari-reniform entire often ciliated.—*Lastrea rubiginosa*, *Brack. Fil. U. S. Expl. Exp. p. 201.* *Nephrodium* (*Lastrea*) *Fijiense*, *Hook. 2d Century of Ferns, t. 67.*— $\beta$ , *nudicaule*?; stipes and rachises destitute of paleaceous hairs.

Hab. Sandwich Islands, *Brackenridge*. Naviti Levu, Fiji Islands.— $\beta$ , *nudicaule*?. Oahu, *Beechey, Diel, Douglas*.—I am indebted, along with a most valuable series of many of the rarest of Mr. Brackenridge's Ferns of the U. S. Expl. Exp., for a fine specimen of that author's *Lastrea rubiginosa*, which satisfies me that my *Nephrodium* (*Lastrea*) *Fijiense* is a very slight variety of it, though from widely distant islands.—I am doubtful about the var.  $\beta$ , which however chiefly differs in the absence of coarse paleaceous hairs on the stipes and rachises; they may probably be very deciduous.

140. N. (*Lastrea*) *Milnei*, Hook.; caudex?, stipes and primary rachises intensely ebeneous-black glossy, frond 1½-2 feet long broad-ovate acuminate membranaceous black-green when dry glabrous bi-tripinnate, primary pinnæ ovate 6-10 inches long petiolate, secondary ones lanceolate 3-4 inches broad lanceolate deeply pinnatifid, segments as well as the

ultimate pinnules distant linear-oblong acute sinuato-dentate or subpinnatifid, the sinuses often having a sharp lobule which forms a zigzag wing to the costa, veinlets distant simple or forked, sori generally one to each lobe of the segment, involucre very cellular cordato-reniform, the margin with glandular hairs. *Hook. 2d Cent. of Ferns, t. 62.*

Hab. Wooded mountains of Naviti Levu, Fiji Islands, *Milne*.—I cannot refer this to any hitherto described species, nor does it appear to be known to Brackenridge. The stipes and main rachises are singularly ebeneous, and the wing, if I may so say, of the main costæ, which unites the segments, has a zigzag appearance, from the frequent presence of an angle or short lobe in the broad sinuses of the segments.

141. N. (*Lastrea*) *tenuifolium*, Hook.; "stipes angular squamoso-hirsute, fronds membranaceus subtripinnate at the base above bipinnate, the apex pinnatifid, pinnules oblong-lanceolate acute pinnato-partite with the base oblique adnato-decurrent, the segments linear-oblong lower ones inciso-serrate, rachis costa and veins on both sides paleaceous glanduloso-hirsute, sori small, involucre reniform lacerate." *Lastrea, Brack. Fil. U. S. Expl. Exp. p. 199.*

Hab. Ovalau, Fiji Islands, in mountain forests, *Brackenridge, Milne*.—I have seen no authentic specimen of this species, but my specimens collected by Milne, in similar localities of Ovalau, sufficiently correspond with the description. It possesses no peculiarly tranchant character. Brackenridge compares it with *Aspid. tenuisectum* of Blume.

142. N. (*Lastrea*) *squamigerum*, Hook. et Arn.; caudex (imperfect) short stout erect, stipites tufted a span to a foot long very paleaceous as well as the rachises with soft ferruginous scales varying in size, fronds 1-1½ foot long membranaceous broad-ovate acuminate bi-tripinnate, primary pinnæ often opposite 4 inches to a span long broad-oblong or ovate acuminate, uppermost ones sessile pinnatifid, secondary ones oblong obtuse an inch or more long nearly ½ an inch wide sessile and decurrent more or less pinnatifid at the margin, ultimate pinnules of the same shape but smaller, veinlets distant simple or forked, sori subbiserial between the costule and the margin, involucre reniform very membranaceous cordato-reniform fimbriato-ciliate, costæ and costules beneath densely clothed with ovato-lanceolate subulate close-pressed obtuse scales different from those of the stipes. (TAB. CCLXX.)—*Hook. et Arn. Bot. of Beech. Voy. p. 106. Brack. Fil. U. S. Expl. Exp. p. 198.*

Hab. Oahu, *Lay and Collie, Seemann, Brackenridge*, who also collected it in

Eimeo, Society Islands, and Ovalau, Fiji Islands.—Well distinguished by the copious scales (quite different from those of the rachis, which clothe the back of the frond) upon the costæ and costules, almost looking as if they were infested with minute scale-insects.—From Assam and Khasya (*Griffith*) I have a *Nephrodium* which I can hardly distinguish from this.

143. *N. (Lastrea) velutinum*, Hook. fil.; caudex?, stipes a foot and more long pubescent reddish-brown, clothed at the base with very long and broad subulate scales, frond 1-1½ foot long (brownish when dry) soft membranaceous velvety on both sides clothed with copious soft silky hairs and often pellucidly and glandularly beneath, deltoid or five-angled acuminate tripinnate rarely and only at the base subquadripinnate, primary pinnæ 4 inches to 1 foot long-petioled as well as the secondary ones broad-oblong acuminate, the basal pair half-ovate, the lowest inferior pinnæ being the longest deflexed and most compound, pinnules sessile scarcely anywhere decurrent oblong acute deeply pinnatifid, the segments and ultimate pinnules ovate obtuse serrate or subpinnatifid, pinnules simple or forked, sori small one to each segment, involucre hairy red-brown sometimes fringed with glands, rachis and costæ generally rufo-velutinous.—*Hook. fil. Fl. Nov. Zel. ii. p. 39. t. 80 (excellent; "N. molle" on the plate by mistake)*. *Aspid., A. Rich. Nov. Zel. p. 70*.

Hab. New Zealand, *D'Urville (A. Richard)*, *Colenso, All. Cunningham, Hooker fil.* Middle Island, Houraki Gulf, and Banks' Peninsula, *Dr. Lyall*.—Well described by Achille Richard, and well figured by Dr. Hooker, except that the large scales at the base of the stipes are not sufficiently copious. It is very distinct from *N. decompositum*, Br.

(*Polystichoid: habit of Polystichum. Sp. 144-151.*)

144. *N. (Lastrea) amplissimum*, Hook.; "frond coriaceous ovate quadripinnate, pinnæ long petiolate ovate, pinnules petiolate oblong-lanceolate, primary ones very acute, tertiary pinnatifid and as well as the secondary ones obtuse, segments oblong obtuse ciliated monosorous uni-bi-tridenticulate, superior ones dentiform, rachises paleaceous, costæ convex on both sides." *Pr.*—*Polystichum, Pr. Tent. Pterid. p. 84. Epimel. Bot. p. 58. Aspidium, Metten. Aspid. p. 68. Lastrea fallax, Hort.*

Hab. Brazil, "*Beyrich*," *Sellow, in Herb. Nostr., Gardner, n. 191 and 5946* (I can hardly distinguish from this the *Phegopteris divergens*, Eat. Plant. Wright. and Fendl., Cuba, *C. Wright, n. 831*, save that the sori appear destitute of involucre).—I must refer to the characters and descriptions of Presl and Mettenius for all that is written on this species. My authentic specimens come very near narrow-segmented forms of *N. excultum*, and to *Phegopt. divergens* among the *Nudisori*.

145. *N. (Lastrea) decompositum*, Br.; caudex long creeping underground black very sparsely scaly at the base, stipites a span to 2-3 feet long, frond a span to 1½ foot long ovate or deltoid or subquincangular acuminate coriaceous-membranaceous firm glabrous or more or less pubescent on the costæ and veins beneath bipinnate 3-4-pinnate below, primary pinnæ 4 inches to a span long broad-oblong acuminate, basal pair half-ovate their lower inferior pinnæ the longest, pinnules varying exceedingly in size on different plants from 2-3 lines to 1-½ inch long lanceolate or ovato-lanceolate decurrenti-coadunate acute or obtuse variously incised or pinnatifid, the segments acutely serrated, veinlets simple or forked remote, sori small distant halfway between the margin and costule, involucres reniform testaceous, rachis glabrous or pubescent. *Br. Prodr. Nov. Holl.* p. 149.—Var. *a. macrophyllum*; less compound, pinnules large. *N. decompositum*, *Br. a.* glabellum, *Hook. fil. Fl. Nov. Zel.* ii. p. 39. t. 73 (*small specimen, otherwise excellent*). *Hook. fil. Fl. Tasman.* ii. p. 149. *Aspid. microsorum*, *Endl. Fl. Norfolk*, p. 9 (*excl.* *Aspid. quinquangulare*, *Kze. in Linnæa*, xxiii. p. 302.). *Aspid. Shepherdii*, *Kze. in Linnæa*, xxiii. p. 230. *Lastrea atro-virens*, *J. Sm. Cat. Cult. Ferns*, p. 59. *Aspid. acuminatum*, *Lowe, Fil.* vi. t. 11. *Hook. fil. Fl. Nov. Zel.* ii. p. 39. t. 79 (*small specimen, less compound than usual, but with larger pinnules; otherwise excellent*). *Hook. fil. Fl. Tasman.* ii. p. 149. *Aspid.*, *Metten. Aspid.* p. 71 (*who refers hither the Aspid. quinquangulare*, *Kze. in Linnæa*, xxiii. p. 302, *from West Africa*). *N. microsorum*, *Endl. Fl. Norfolk.* p. 9.—Var. *β. microphyllum*; pinnules small, fronds generally more compound. *Nephrod. glabellum*, *All. Cunn. in Comp. to Bot. Mag.* ii. p. 367. *Metten. Aspid.* p. 69. *Lastrea davallioides*, *Brack. Fil. U. St. Expl. Exp.* p. 202.

Hab. Var. *a. macrophyllum*. Australia, probably universal. *Brown* (Port Jackson), Victoria, *Mueller, Robinson*, and as far north as Moreton Bay, *Mueller, Hill, etc.* North-west Australia, *Bynoe*. Tasmania, *Gunn, Hooker fil.* Norfolk Island, common, *Menzies, Bauer, etc.*—Var. *β. microphyllum*. Rare in Australia, Clarence River, *Dr. Beckler (Mueller)*, specimens large, 2 feet and more long. New Zealand, Northern Island, abundant, Cook's Straits, *Dr. Lyall*, the only form of the plant in these islands. Tahiti, *Brackenridge*. Ngau, Fiji Islands, *Milne*. Tasmania, *Stuart (Mueller)*.—An extremely variable species, as *Dr. Hooker* has justly observed; and such variations are more common among the compound Ferns than the less ramified ones.

146. *N. (Lastrea) pubescens*, Desv.; caudex creeping the thickness of a goose-quill scaly, stipites solitary a span to 1½

foot long, fronds 6-12 inches long firm-membranaceous subcoriaceous pale-green soft-villous (the costæ pubescent on both sides) deltoideo-ovate acuminate bi- below tripinnate, primary pinnæ petiolate 2-6 inches and more long broad-oblong acuminate, basal pair half-ovate, lowest inferior secondary pinnæ the longest, uppermost primary pinnæ pinnatifid, pinnules petiolate from a cuneate base obliquely ovate subauriculate entire or lobato-pinnatifid, the lobes short acute, the superior base truncate, veinlets twice or thrice forked here and there anastomosing, sori small distant in two series between the costule and the margin, involucre small reniform membranaceous villous.—*Hook. et Grev. Ic. Fil. t. 102 (young specimen)*. *Aspidium, Sw. Syn. Fil. p. 56. Willd. Sp. Pl. v. p. 271. Lastrea, Pr. Polypodium, Linn. Phegopteris Portoricensis, Fée, Gen. Fil. p. 343. Metten. Aspid. p. 14. Eat. Fil. Fendl. et Wright. p. 208.*

Hab. Jamaica, *Swartz, Wilson, Purdie*. Cuba, *C. Wright, n. 815, n. 1000*, large, 1 foot long. Porto Rico, *Baron de Schach*. Guadeloupe, *Beaupertuis, n. 1164 (ex Herb. Mus. Hist. Nat. Paris)*.—Very variable in size. The *Phegopteris Portoricensis* of Eaton, in *C. Wright's Fl. Cub. n. 1000*, is a large form of this species, in which the involucre has been overlooked or, possibly, are suppressed.

147. N. (*Lastrea*) *acutum*, Hook.; caudex?, stipes 2 feet and more long thicker than a goose-quill chestnut-brown smooth without scales (unless at the base, which I have not seen), fronds ample 2 feet long broad-ovate firm subcoriaceo-membranaceous acuminate, primary pinnæ petiolate ovato-lanceolate finely acuminate pinnatifid at the apex the rest pinnate, pinnules sessile 1-3 inches long lanceolate long-acuminate deeply pinnatifid, segments oblong very acute sub-falcate acutely and often pungently serrated, veinlets simple distant, sori in two series between the costule and the margin, involucre dark-brown cordato-reniform. (TAB. CCLXXI.)—*Lastrea acuta, Kl. in Herb. nostr.*

Hab. Brazil, *Sellow, in Herb. nostr.* Near Tarapota, Eastern Peru, *Spruce, n. 4662*.—This has the largest pinnæ and pinnules of any of the polystichoid *Nephrodia* known to me. I am indebted to the late Dr. Klotzsch for an authentic specimen. *Spruce's n. 4662*, from Tarapota, appears to me to be quite the same species. I cannot find that Klotzsch has anywhere published it.

148. N. (*Lastrea*) *denticulatum*, Hook.; caudex short stout oblique densely clothed with long linear-subulate dark-brown falcate glossy scales  $\frac{1}{4}$ – $\frac{3}{4}$  inch long, stipites tufted scaly at the base 1– $\frac{1}{2}$  foot long brown or stramineous, frond



1-1½ foot long coriaceous glossy deltoid acuminate quadripinnate, primary (secondary and tertiary) pinnæ petiolate broad-oblong acuminate, basal pair semiovate, the lowest inferior secondary pinnæ the longest, all of them uniformly divided in a pinnated manner to the last division, the ultimate pinnules, which are obliquely ovate or obovate, 2-3 lines long cuneate and subdecurently petiolate with 2-3 sharp mucronate teeth towards the apex, veinlets more or less forked, sori generally one to each lobe or ultimate pinnule large, involucre large cordato-reniform often with a very indistinct sinus pale-brown subcoriaceo-membranaceous.—*Aspidium*, *Sw. Syn. Fil. p. 57. Willd. Sp. Pl. v. p. 272. Metten. Aspid. p. 68. Lastrea, Moore. Polypod., Sw. Fil. Ind. Occ. iii. p. 1692. Polystichum aspidioideum, Kl. (young fronds.) Aspid. Klotzschii, Hook. Ic. Pl. t. 923. Lastrea, Moore. Aspid. lætum, Sw. Vetensk. Acad. Handel. 1817. lxiii. t. 4. f. 3 (fide Metten.).—Var.  $\beta$ , *rigidissimum*; ultimate pinnules narrow linear-spathulate subincised.*

Hab. Tropical America, frequent: Jamaica, *Wilson, Purdie*; New Granada, *all collectors*; British Guiana, Brazil, *Gardner, n. 1881 and 5943, etc.*—Var.  $\beta$ . Jamaica, *Purdie, Wilson* (who observes, "I mistook this at first for the leaf of a carrot"). St. Domingo, *Schomburgk*. New Granada, *Linden, n. 1297. Schlim, n. 323.*

149. N. (*Lastrea*) *macrostegium*, Hook.; caudex?, stipes (lower portion only in my possession a span long) stout  $\frac{1}{3}$  of an inch in diameter brown very paleaceous at the base with dense soft long subulate crisped scales the rest crinite with longer more scattered firmer often falcate ones, frond ample deltoid 2 feet long very broad deltoid-ovate acuminate coriaceous everywhere glabrous quadripinnate, basal primary pinnæ 12-14 inches long semiovate their lowest secondary pinnæ very long 6-8 inches resembling the rest of the primary pinnæ bipinnate, tertiary pinnæ more or less petiolate unequally oblongo-ovate obtuse or acute pinnatifid below pinnate and cuneate subauriculate, the lowest superior pinnule and segment rather the largest, ultimate pinnule 2-3 lines long ovate obtuse and obtusely crenato-serrate, veinlets once or twice forked, sori 4-6 on each pinnule in two rows between the costule and margin, involucre so large that they cover nearly the whole underside of the segments or ultimate pinnules pale-brown membranaceous reniform substipitate persistent with a deep depression at the sinus and waved at the margin.

Hab. Rio Uaupés, a tributary to the Amazon, *Spruce* ("gregaria cæspitosa, stipes 3-pedalis et ultra; frons bipedalis").—This new species is justly entitled to rank among the polystichoid *Nephrodia*, and is readily distinguished from *N. excultum* by the smaller ultimate pinnules, their muticous teeth, and, above all, the very large size and colour of the involucre, which are depressed near the centre and have the margin waved.

150. N. (*Lastrea*) *platypus*, Hook.; "caudex?, stipes in the upper part terete testaceous glabrous slender, frond  $1\frac{1}{2}$  foot long thin-coriaceous glossy subdeltoideo-ovate acuminate bipinnate tripinnate below, primary pinnæ 6–10 inches long petiolate, superior ones ovato-oblong acuminate subfalcate, basal ones the longest and bipinnate, pinnæ and ultimate pinnules all obliquely ovate acuminate at the base, superior base auricled the rest subpinnatifid with pungent and serrated lobes, veinlets twice or thrice forked, sori in two series halfway between the costule and the margin, involucre large convex cordato-reniform membranaceous finely fimbriated on a short stipes." *Aspidium*, Kze. *Bot. Zeit.* vi. p. 262. *Metten.* *Aspid.* p. 69.

Hab. Java. "*Zollinger*, n. 3845." Mountains, Moulmein, alt. 5000 feet, *Thos. Lobb*.—The general aspect of this Fern is that of *Aspid.* (*Polystichum*) *aristatum*, but the frond is more compound and the sori are never near the margin. The only specimen I have seen possesses neither caudex nor the entire stipes, but the frond and fructification are very perfect. I need hardly say it has no close affinity with any known *Nephrodium*.

151. N. (*Lastrea*) *excultum*, Hook.; caudex short thick, "stipes  $1\frac{1}{2}$  foot long laxly paleaceous glandulosely hirsute above, frond subcoriaceous  $1\frac{1}{2}$  foot long bright-green glabrous above beneath sprinkled with minute cylindrical subglandulose hairs ovate acuminate, proliferous below the apex, tripinnate, primary segments distant suberecto-patent curved upwards, lowest ones 8 inches long petiolate unequally ovate acuminate the prolonged apex sharply serrated, secondary pinnæ rectangularly patent, lower ones petiolate ovate acuminate superior ones tapering and adnate at the base from the inferior cuneate base the superior truncate and broader oblong acutely attenuate at the apex, basal ones of the inferior side very large, tertiary pinnules approximate coadunate ovate or oblong submucronate, lowest ones pinnatifid, superior ones inciso-serrate, segments subfalcate acute, branches of the veins undivided soriferous, sori between the costule and margin, involucre rotundato-reniform black in the middle, the margin brown coriaceous glabrous persistent."

*Metten.*—*Aspidium*, *Metten. Aspid. p.* 69. *Lastrea*, *Moore. Aspid. lætum*, *Moritz (non Sw.)*. *Aspid. melanostichum*?, *Kze. in Linnea*, xiii. *p.* 148. *Polystichum*, *Liebmann. Fil. Mex. p.* 124.

Hab. Tropical America: Caraccas, *Moritz, n.* 433, *Linden*, 122; Venezuela, *Fendler*, 330; Rio, *Gardner*; Jamaica, *M'Fadyen*; Cuba, *C. Wright, n.* 831, *Linden, n.* 1743; Peru, *Mathews, n.* 1830; Tarapota, Eastern Peru, *Spruce, n.* 4663; Ecuador, foot of Chimborazo, alt. 3000 feet, *Spruce, n.* 5722; Mexico, *Liebmann, in Herb. nostr.* (at least I cannot distinguish sterile specimens from the author of *Aspid. melanostichum*, *Kze.*, which is also prolific at the apex, like *excultum*).—This, like our *N. platypus* and the following species, has quite the habit of a *Polystichum*. Our specimens from Peru and Ecuador seem to attain a much larger size than those from other parts of America.

152. *N. (Lastrea) hispidum*, *Hook.*; caudex stout creeping densely paleaceous with long subulate red-brown scales, stipites distant stout a foot and more long hispidocrinite with long deflexed bristles bulbous at the base and almost black, the same but smaller and spreading bristles are continued up the main and secondary rachises and costæ, fronds a span to 1½ foot long coriaceous-chartaceous ovate acuminate 3-4-pinnate subsericeo-pubescent beneath, primary pinnæ 3-6 inches long ovate acuminate all petiolate, lowest pair deltoideo-acuminate, secondary ones of the same shape or narrower, ultimate pinnules narrow-lanceolate ¼-½ an inch long deeply pinnatifido-serrate, the segments pungently acute, all the ultimate rachises with a narrow wing so that the pinnules are decurrently adnate, veinlets central solitary in each division and segment, sori one to each ultimate segment, involucre dark-brown the disk almost black firm persistent orbicular plane more frequently polystichoid than lastreoid, the sinus very indistinct.—*Aspidium hispidum*, *Sw. Syn. Fil. p.* 56. *Willd. Sp. Pl. v. p.* 266. *Metten. Aspid. p.* 70. *Schk. Fil. p.* 49. *t.* 49. *Polystichum*, *J. Sm. Hook. fil. Fl. Nov. Zel. ii. p.* 38. *Polyst. Schkuhrii*, *Pr. Polypodium setosum*, *Forst. Prodr. p.* 82.

Hab. New Zealand, *Forster, in Herb. nostr.*, *Menzies, A. Cunningham, Colenso, Fraser, J. D. Hooker*; Middle Island, *Bidwill, Dr. Lyall*.—A very fine and very distinct species, quite peculiar to New Zealand.

Of the *Aspidium*-group, including *Euaspidium*, *Polystichum*, *Nephrodium*, *Lastrea*, there are many imaginary and, no doubt, some good species found in books more than are here noticed. Many of them could not be introduced with any prospect of benefiting science, and the difficulty would be to know where to stop—how to sift the chaff from the wheat.

## 4. NEPHROLEPIS, Schott.

(HOOK. GEN. FIL. TAB. XXV. *Aspidium* and *Nephrodium*, Auct. *Lepidoneuron*, Fée.)

*Sori* dorsal, arising from the apex of the superior branch of a veinlet, generally at or near the margin. *Involucres* cordiform or reniform or almost crescent-shaped, attached by a broad base to the receptacle, hence resembling some of the *Humata*-group of *Davallia*.—*Tropical or subtropical Ferns with a creeping caudex or, more generally, it is slender, suberect, flexuose, apparently a prolongation of the stipes, and sends out strong sarmentose and often rooting fibres, in one species bearing large fleshy tubers.* Fronds generally coriaceous, pinnated. Pinnæ entire or mostly pinnatifid, articulated upon the rachis, and having a strong central costa.—Ferns with a peculiar habit in most of the species, and the Genus is maintained by most Fern-authors.

1. *N. tuberosa*, Pr. ; caudex indistinct, apparently wiry root-fibres frequently bear large oval scaly tubers, stipites 1–4 inches and more long deciduously paleaceous, fronds 1–2–3 feet long linear-lanceolate coriaceous-submembranaceous acuminate pinnate, pinnæ numerous approximate  $\frac{1}{2}$ –1 inch long glabrous horizontal from a truncate or cordate base more or less auricled above, oblong obtuse or especially the fertile ones crenated rarely acuminate often subfalcate, lower and sterile ones shorter and more obtuse, auricle acute, sori transverse about equidistant from the margin and the costa, involucres firm coriaceous reniform or nearly halfmoon-shaped brown opening towards the apex of the pinnæ, the base and point of insertion broad and generally black.—*Aspid.*, Bory, in Willd. *Sp. Pl.* v. p. 234. *Nephrolepis*, Pr. Metten. *Fil. Hort. Lips.* (who refers to it *N. imbricata*, Kaulf. *N. undulata*, J. Sm. and Sw. ?) *Aspid. sublanosum*, Wall. *Cat. n.* 365 (in part).—Var.  $\beta$ , *pendula* ; elongated and pendulous from trees. *Aspid. pendulum*, Raddi, *Fil. Bras. p.* 30. *t.* 45. *Nephrolepis*, Pr.—Var.  $\gamma$ , *delicatula* ; small, pinnæ membranaceous. *Nephrodium delicatulum*, Dcne. in Jacqem. *Voy. Bot. p.* 178. *t.* 179. *Aspid. Tavoyanum*, Wall. *Cat. n.* 1032.

Hab. Bourbon and Mauritius, Sieber, *Fl. n.* 41 (*Aspid. imbricatum*), and Klfs. and Sieber, *Fl. Mixta*, n. 246. Western Tropical Africa. Vogel, Irving, G. Mann (both broad and narrow fronds). East Indies : Madras Peninsula, Wight, n. 114 ; Northern India, Wallich, Griffith, Jacquemont, Hooker fil. et Thomson ; and Khasya and Assam to Moulmein, Parish, n. 26 ; Ceylon, Gardner, n. 1877 ; Java,

*Blume* (Aspid. imbricatum and *A. obtusifolium*, *Bl.*), *De Vriese and Teijsmann*; Luzon, *Cuming*, n. 213. Hongkong, *Urquhart*, *C. Wright*. Loochoo, *Beechey*. Formosa, *Wilford*. South Japan, *J. Small*. Fiji Islands, *Milne*, *R. Oldham*, *Brackenridge* (*N. obtusifolia*, *Pr.*). Australia: Brisbane River, *Mueller*; Teviot River, *Fraser*. Norfolk Island, *Simmons*. New Zealand, *Sinclair*. South America: West Indies, Jamaica, *Hartweg*, n. 1508 and 1583; Mexico, *Liebmann* (*N. occidentalis*, *Kze.*); Brazil, common, *Gardner*, n. 4081, *Sellow* ("N. exaltata," from *Herb. Hort. Reg. Berol.*); New Granada, *Moritz*, *Fendler*, n. 161, *Linden*, n. 318 and 6374; Peru, *Mathews*, n. 3290, 1106, *Spruce* (Tarapota), n. 4082, *Pæppig* (from *Kunze*), *Lechler*, n. 2155; Ecuador, *Jameson*; Guiana, *De Vriese* ("N. solida").— $\beta$ , *pendula*. Brazil, *Raddi*, *Fox*. Pichincha, Ecuador, *Jameson*. Venezuela, *Linden*, n. 1690.— $\gamma$ , *delicatula*. North-west India, between Carli and Canderla, *Jacquemont*; Maturan, *Col. Bates*; Tavoy, *Wallich*, n. 1032: *Khasya*, *Hooker fil. and Thomson*; Moulmein, on trees, *Parish*, n. 26.—A species very variable in the breadth of the frond and in the more or less crowded pinnules, and, though difficult to define, easily enough distinguished when the curious tubers are present on the frond, from which the species derives its specific name. On the Cameroon Mountains, Mr. G. Mann has detected it on an elevation of 4500 feet. White, waxy, small, circular scales form dots on the upper sides of the pinnæ of this and other species of the genus.

2. *N. exaltata*, Schott; stipes 1 foot and more long and as well as the rachis and costæ more or less villosopaleaceous often quite glabrous, fronds subcoriaceous  $1\frac{1}{2}$ –2 feet long oblong-lanceolate pinnated, pinnæ 1–2–3 inches long oblong more or less acuminate with a broad truncated or subcordate base parallel with the rachis with a sharp auricle above and sometimes below, the margin entire or crenato-serrate, sori almost quite marginal, involucre coriaceous reniform with a very broad sinus.—*Aspidium*, *Sw. Syn. Fil.* p. 45. *Schk. Fil. t. 32 b* (a much reduced figure, with a portion of the lower part of the frond only nat. size). *Raddi, Fil. Bras.* p. 30. t. 46. *Nephrolepis*, *Pr. Metten. Fil. Hort. Lips.* p. 100 (who refers hither *N. neglecta*, *Kze. in Linnæa*, xiii. p. 148, and *N. intramarginalis*, *Kze. l. c. xxiii. p. 301*). *N. platyotis*, *Kze. in Linnæa*, xxiii. p. 312. *Metten. Fil. Hort. Lips.* p. 100. t. 26. ff. 1–5? (the auricles near the middle of the frond unusually large). *N. hirsutula*, *Pr. Aspid., Schk. Fil. t. 33* (very good for the form, with longer and narrower pinnæ). *Aspid. pilosum*, *Langsd. and Fisch.* p. 14. t. 16. *A. Schkuhrii*, *Bl. En. Fil. Jav.* p. 147 (and in *Herb. nostr.*).

Hab. Very common in tropical countries. Mexico, *Liebmann* (*N. neglecta*, *Kze.*). New Granada, *Schlim*, n. 221, 232, *Fendler*, n. 162, 370, p. 243, *fide Metten.* (*N. occidentalis*, *Kze. in Linnæa*) n. 18, *Otto*, n. 657. Panama, *Fendler*, n. 418, *S. Hayes*, n. 171. West Indies: Jamaica, *Hartweg*, n. 1508; Cuba, *Wright*, n. 826 (*N. sesquipedalis*, *Pr., fide Metten.*). Guiana, *Rd. Schomburgk*, n. 1667? (*N. ensifolia*, *Pr., fide Kl.*). Brazil, *Martius* ("N. rufescens, *Sond.*"), *Sellow* (*N. sesquipedalis*, *Raddi, Kl.*, and *N. pilosa*, *Pr., Kl.*), *Gardner*, n. 1221, *Spruce*, n. 19. Peru, *Lechler*, n. 2515 ("N. sesquipedalis, *Pr.*"). Ecuador, foot of Chim-

borazo, pendulous from the branches of trees, sterile fronds sometimes 12 feet long, *Spruce*, n. 5727. Pacific Isles: Otaheite and Pitcairn's Isles, rufo-paleaceo-hirsute, *Mathews*, n. 6, *Cuming*, n. 1419 and 1381. Isle of Pines and Fiji, *Milne*, *Seemann*, *Harvey*. Oahu, *Seemann*, *Brackenridge*. Dunk Island, *Macgillivray*. Teviot River, Australia, *Fraser*. Tropical West Africa, south of the line, *Currer* (rufo-pubescent). Indian Continent: most abundant from the Madras Peninsula (*Wight*, n. 27) in the West, to Himalaya, Bhotan, and Moulmein (*Parish*, n. 54) in the East, *Wallich*, n. 1031, *Hohenacker*, *Pl. Ind. Or.* n. 600 (*N. hirsutula*, *Pr.*). China, *Alexander*; Hongkong, *Hance*, *Wilford*, *Vachell*, *Wright* ("N. hirsutula, *Pr.*"). Ceylon, *Mrs. Genl. Walker*, *Gardner*, n. 1089. Malay Archipelago: Malacca, *Cuming*, n. 406, *Griffith* (*N. volubilis*, *J. Sm.*); Java, *Blume* (membranaceous pinnae falcate, *Aspid. ensifolium*, *Bl.*; common form, *A. hirsutulum*, *Bl.*, and *A. Schkuhrii*, *Bl.*), *De Vriese and Teijsmann*, n. 343, 353 (Sumatra), 335, 349, 348 (Ternate), Singapore, Prince of Wales Island, etc.—Numerous as are the above localities, I have restricted myself very much to such specimens as have been circulated with numbers, or as have well-authenticated names. Judging from many of my specimens, I fear the form of the involucre is variable, sometimes, in age especially, scarcely distinguishable from that of *N. acuta*, while others, particularly in a young state, very much resemble those of *N. tuberosa*, which constitutes a different genus according to Fée.

3. *N. acuta*, *Pr.*; stipites 1–2 feet long subpaleaceous with subulate long ciliated scales mixed with longer ones terete very smooth olivaceous, fronds 2–4 and more feet long 8–12 inches broad oblong-lanceolate membranaceous more or less firm horizontal  $\frac{1}{2}$ –1 inch broad sword-shaped (oblong-lanceolate) distant more or less acute or acuminate obliquely truncato-cuneate at the base, entire or serrated or irregularly and coarsely crenate rarely subauriculate, lower ones oblong-elliptical obtuse, sori distant from the margin but nearer to it than to the costa, involucre cordate when young, almost orbicular.—*Aspid. acutum*, *Schk. Fil. p.* 32. *t.* 31. *Sw. Syn. Fil. p.* 46. *Willd. Sp. Pl. v. p.* 220. *Aspid. splendens*, *Willd. Sp. Pl. l.c. p.* 220. *Bl. En. Fil. Jav. p.* 147, and in *Herb. nostr.* *Aspid. paludosum*, *Raddi, Fil. Bras. p.* 29. *Nephrolepis biserrata*, *J. Sm. in Hook. Bot. Journ. iii. p.* 413. *Sieb. Syn. Fil. n.* 39, and *Sw. ? viz Schk. Fil. t.* 33 c? (pinna only).— $\beta$ , *subferruginea*; rachises and costæ ferrugineo-hirsutulous beneath. *Arana-panna*, *Rheede, Hort. Malab. xii. p.* 61. *t.* 31.

Hab. India, *Rheede, Klein*. Java, *Blume, Zollinger*, n. 146, *De Vriese and Teijsmann*, n. 339. Borneo, *De Vriese and Teijsmann*, n. 55. Malacca, *Griffith*. Luzon, *Cuming*, n. 22. Moulmein, *Parish*, n. 55. China: Hongkong, *Urquhart, Wilford*. Ceylon, *Mrs. Genl. Walker*. Pacific Islands, Society Islands, *Bidwill, Cuming*, n. 1480. Aneiteum and Fiji Islands, and Frankland Islands, and Dunk Island, *Milne, Macgillivray, Harvey, Seemann*. Isle of Pines, *Milne*. Navigators' Islands. Tropical East Coast of Australia, *All. Cunningham*. Mauritius, *Sieber, etc.* Tropical East Africa: Galega Island and Madagascar, *Bojer*; Johanna Island, *Speke*. West Africa, *Vogel, Barter, Ansell*; Abeokuta, *Irving*; Senegambia, *Herb. Mus. Par.* South America: Brazil, *Raddi* (*Asp. paludosum*),

*Gardner*, n. 187, 1233, *Spruce*, n. 20, 21, 1292; Guiana, *Parker*, *Sagot*, n. 724, 137; Surinam (*De Vriese*); Panama, n. 258, *Hayes*; Venezuela, *Fendler*, n. 420; Columbia, *Cuming*, n. 1263. West Indies: Cuba, *Wright*, n. 1011 (*N. punctulata*, *Eat. Fil. Wright and Fendl.* p. 212); Jamaica, *Purdie*; Dominica, *Inray*.— $\beta$ . Singapore, *Schomburgk*, n. 23. Ceram and Banda, *De Vriese and Teijsmann*.—I have long foreseen the difficulty attending the successful study of the species of this genus, of which Presl alone enumerates twenty-nine species. My extensive series of specimens, from various parts of the world, will not justify me in following his steps, and if I have under-estimated the amount, it is yet, I believe, the safest and wisest course to pursue. As hitherto described, many of them are utterly unintelligible. Of the present species, different as it may appear in its most perfect form (as represented, for instance, by *Schkuhr*) from some states of *N. exaltata*, there are intermediate grades which I cannot safely refer to the one or the other.

4. *N. obliterata*, Hook.; caudex very long filiform here and there subsquamoso-tomentose rooting with few short fibres, stipites scattered short 1–2 inches long and as well as the rachis dark-brown subpubescent, fronds 3–12–14 inches long oblong or linear-oblong membranaceous invariably black when dry, pinnated, pinnæ from  $\frac{1}{2}$ – $1\frac{1}{2}$  inch long horizontally patent rather distant dimidiato-oblong obtuse or acute rarely acuminate obliquely cuneate at the base sessile straight or subfalcate, superior base truncate and parallel with the rachis, frequently with a sharp auricle, the margin entire or crenate or lobato-dentate especially on the fertile pinnæ, costæ slender flexuose, veinlets forked upper branch bearing sori at the apex a little distance from the margin, involucre small cordato-reniform soon obliterated.—Nephrodium oblitteratum, *Brown, Prodr. Fl. Nov. Holl.* p. 148. Aspid. undulatum, *Sw. Syn. Fil.* p. 45? (*excl. Syn. Cav., fide Willd.*). *Willd. Sp. Pl.* v. p. 223? Nephrod. subpectinatum, *Bl. En. Fil. Jav.* p. 145. *N. trichomanoides*, *J. Sm. in Hook. Bot. Journ.* iii. p. 413 (*name only*). *N. repens*, *Brack. Fil. U. S. Expl. Exp.* p. 209.

Hab. Tropical Australia, *Sir Jos. Banks*: Endeavour River, *All. Cunningham*; M'Leay River, *Dr. Beckler (F. Mueller)*. Tropical West Africa: Sierra Leone, *Afzelius*; Angiama, Lower Niger, climbing on small trees and adhering to them like ivy, caudices 10 feet long, *Barter, in Baikie's Niger Exped.* n. 146 and 292 (some of the pinnæ 2 inches long). Fernando Po, *Barter, G. Mann*, n. 246. Society Islands, *Nightingale*. Fiji Islands and Samoan Islands, *Brackenridge, Milne*, n. 299, *Seemann*, n. 831. India: Java, *Blume, in Herb. nostr.*; Luzon, *Cuming*, n. 101; Ceram, *De Vriese and Teijsmann*, n. 235; Ceylon, *Gardner*, n. 1094 and 1376.—A well-marked species, which though varying in the size and somewhat in the form of the pinnules, is yet easy to be recognized. In the long creeping caudex and scattered stipites it is peculiar in the genus, and the pinnæ are not distinctly articulated.

5. *N. davallioides*, Kze.; caudex very short erect stolo-

niferous, stipites aggregated 1 foot and more long hispidopaleaceous towards the base, fronds 2-2½ feet long subcoriaceous-membranaceous ovato-lanceolate acuminate glabrous pinnated, pinnæ rather distant numerous patent 4-6-8 inches long from a cuneate base oblong- or linear-lanceolate much acuminate, lower and sterile ones ½-1 inch broad and serrated, fertile ones narrower and longer and more finely acuminate pinnatifid about halfway down to the costæ, segments oblong obtuse bearing a single sorus at the apex, involucre reniform, rachis and costæ beneath very sparingly paleaceous.—Kze. in *Bot. Zeit.* iv. p. 460. *Metten. Fil. Hort. Lips.* p. 100. *Hook. Fil. Exot. t.* 60. *Aspid., Sw. Syn. Fil.* p. 48 et 247. *Willd. Sp. Pl. v. p.* 242. *Bl. En. Fil. Jav. p.* 148. *Hook. Ic. Pl. iv. t.* 395-6. *Ophioglossum acuminatum*, *Houtt. Linn. Pfl. x. p.* 53. *t.* 94. *f.* 3.

Hab. Java, in wooded mountains, *Thunberg, Millett, Thos. Lobb, De Vriese and Teijsmann*, n. 337.—This and the following are very peculiar species. The present, as far as yet known, is only found in the mountain-woods of Java.

6. *N. floccigera*, Moore; caudex?, stipes?, frond 2-3 feet long coriaceous-membranaceous broad-lanceolate furfuraceous-paleaceous beneath, pinnated, pinnæ numerous patent 4-6 inches and more long from a subtruncated and sometimes slightly auriculated base oblong acuminate, inferior and sterile ones ½-¾ of an inch broad entire or serrated only, towards the apex, upper and fertile narrower and longer much and finely acuminate crenato-dentate or at the apex pinnatifido-dentate, teeth usually bidentate, segments of the apex entire, sori marginal, one on each tooth or lobule.—*Aspidium*, *Bl. En. Fil. Jav. p.* 149.

Hab. Island of Celebes, *Blume, in Herb. nostr.* Java, *Millett, Thos. Lobb*.—Blume compares this with "*Aspid. bidentatum*, Spr." However nearly it may be allied to that (whatever that may be), it has a close affinity with our preceding species; so much so, that were the flocculose pubescence the only character, I should be disposed to consider it a variety of that; but the pinnæ are never more than crenato-lobate, and the teeth are again bidentate, the superior ones only subpinnatifid: in both species the sorus is upon the tooth or lobule, whereas in most of the species of *Nephrolepis* the venule that bears the sorus is directed to the *sinus* of the teeth or lobes. My specimens of *Aspid. floccigerum*, Blume, from Celebes, are quite uniform with those of Millett and Thos. Lobb from Java.

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Of the genus *Nephrolepis*, I have no authentic knowledge of *N. rhizodes*, Kze. *Bot. Zeit.* vi. p. 236; *N. Zollingeriana*, *paleacea*, *pendula*, and *depauperata*, of De Vriese; nor of *N. occidentalis*, Kze. in *Linnæa*, xviii. p. 243.



## 5. OLEANDRA, Cav.

(HOOK. GEN. FIL. TAB. XLV. B. *Aspidium*, Auct. *Neuronia*, Don.)

*Sori* dorsal, globose, generally inserted near the base of the very compact free veinlets, and often in a more or less interrupted and chain-like series. *Involucres* cordato-reniform.—*A small but very natural genus of tropical or subtropical Ferns. Caudex* creeping. *Stipes* nodoso-articulate below the middle. *Fronds* simple, entire, lanceolate or subelliptical, acuminate, coriaceous or membranaceous, often very glossy or satiny.

1. *O. neriiformis*, Cav. ; caudices suberect or scandent stout woody knotted branched and here and there beset with short spines which are the persistent basal joints of the petioles of fallen fronds, copiously rooting below, densely clothed with appressed imbricated subulate scales at first ferruginous then diaphanous at length deciduous or leaving only small black spots the remains of the persistent scales, fronds 6 inches to  $1\frac{1}{2}$  foot long scattered or often in terminal whorls lanceolate caudato-acuminate varying in breadth coriaceous and glossy or firm-membranaceous glabrous or partially villous or pubescent on the veins and costæ, petiole 2 lines to an inch long rarely more, jointed very near the base, glabrous or setose or rarely scaly, sori in a continuous but flexuose line, involucres reniform.—“Cav. *Præl.* 1801. n. 623. *et Hort. Reg. Madrit. cum. Tab.*” (Sw.) Hook. *Fil. Exot. t.* 58. *O. neriifolia*, Pr. *Aspid. neriiforme*, Sw. *Syn. Fil. pp.* 42 and 237. Willd. *Sp. Pl. p.* 58. Bl. *En. Fil. Jav. p.* 140. Kunze, in *Schk. Fil. Suppl. p.* 35. t. 18. *Aspidium articulatum*, Sw. *Syn. pp.* 42 and 236. *Oleandra*, Pr. *Aspid. Wallichianum*, Belang. et Bory, *Fl. Ind. Or. Crypt. p.* 56. t. 9. A. *Salaciense*, Kze. in *Bot. Zeit.* iv. p. 461. *Ophiopteris verticillata*, Reinw. *O. micans*, Kze. in *Bot. Zeit.* ix. p. 346.— $\alpha$ , *vulgaris* ; fronds 6–8 inches long firm coriaceous glossy often narrow-lanceolate, petiole  $\frac{1}{2}$ – $\frac{3}{4}$  of an inch long with the articulation below the middle.— $\beta$ , *brachypus* ; fronds 4–5 inches long exactly lanceolate very coriaceous and glossy, petiole 2 lines long with the articulation at its summit.— $\gamma$ , *hirtella*, Moore ; more or less villous with fine soft hairs. *Oleandra mollis*, Pr. *O. pilosa*, Hook. in *Gen. Fil. t.* 45 b. *O. Trujulensis*, Karst. *Fl. Columb. i. t.* 73, and *Miq. in Herb. nostr.* *O. hirtella*, *Miq. in Schk. Fil. Suppl. t.* 129.

Hab. Tropical and subtropical Asia. Java, *Thunberg*, *Blume*, *Reinwardt*, *Belanger*, *Thos. Lobb*, *De Vriese and Teijsmann*, n. 66, 342. Luzon, *Née*. Mishmee, Assam, *Griffith*. Khasya and north to Sikkim, *Hook. fil.* and *Thomson*. Nepal, *Wallich*. Ovalau and Fiji Islands, *Brackenridge*, *Milne*, and *Aneiteum*, *C. Moore*, all with the sori quite costal. Ceylon, *Gardner*. Bourbon, Mauritius (Aspid. articulatum, *Sieb. Syn. Fil.* n. 3), *Bojer*. Macalisberg, South Africa, *Burke*, n. 530 (an *O. articulata*, *Pappe and Rawson*?). Tropical West Africa: Fernando Po, *G. Mann and Barter* (normal state); Prince's Island, *Barter*, in *Baikie's Niger Exp.* n. 1928. South America: New Granada, *Purdie* (the same as the Indian form, but petioles scaly), *Karsten*; Peru, *Lechler* (*O. micans*, *Kze.*, costa pubescent beneath.—*β*. Malay Archipelago and Islands, *Griffith*, *Thos. Lobb*, *Sir Wm. Norris*.—*γ*. Luzon, *Cuming*, n. 94. "Java (*Miquel*)," according to *Kze.* (I possess what I consider the same from *Miquel*, marked "*O. pilosa*, *Hook.*, from Surinam"). French and British Guiana, *Le Prieur*, *Schomburgk*, n. 416. New Granada, *Purdie*.—Presl alone enumerates twelve species of *Oleandra*, and to these M. Karsten has lately added another; but if those species that I am unacquainted with in an authentic form are no better than those I am able to verify, it is quite certain there are more species than there are good ones. It is impossible, with the extensive suites of specimens before me from Asia, Africa, America, and Polynesia, not to see that the individuals of this genus are peculiarly liable to vary. One of the best characters to rely upon is, perhaps, the relative length of the joints of the petiole, though this is not an unerring one. The present species is remarkable for the length and somewhat erect habit of the stout caudex, and the shortness of the petiole, especially of the lower joint.

2. *O. nodosa*, Pr.; caudex creeping scarcely so thick as a goose-quill moderately branched crinite with subulato-setaceous ferruginous flexuose or subsecund spreading scales, stipites distant 2–4–6 and even 8 inches long smooth and polished nodoso-articulate below the middle, lower joint an inch or more long, fronds 8–12 inches long satiny-membranaceous lanceolate finely acuminate 2–2½ inches broad, sori in two or more flexuose series with many scattered ones but not extending to the margin, involucre dark-brown reniform.—*Pr. Tent. Pterid.* p. 78. Aspid. nodosum, *Willd. Sp. Pl.* v. p. 211. *Hook. Ex. Fl.* t. 117. *A. articulatum*, *Schk. Fil.* t. 27. *Lingua cervina lucida*, *Plum. Fil.* p. 118. t. 136.

Hab. West Indies, frequent: Martinique, *Plumier*; St. Vincent's, Cuba, Trinidad, Dominica, Jamaica, Guadeloupe, etc. Guiana, *Sagot*, *Le Prieur*, *Schomburgk*, *Appun*. Tropical West Africa: Fernando Po, on Oil-Palms, *Barter*; on the Peak, alt. 2000 feet, *G. Mann* (less satiny, but the costa beneath dark-brown and very glossy); Madagascar?, in *Herb. nostr.* (petioles of *O. nodosa*, but frond and fructifications of *O. neriiformis*; the portion of the stipes, too, attached to the fronds, more resembles the latter species.)

3. *O. hirta*, Brack.; "caudex creeping paleaceous-hirsute articulated in the middle, fronds membranaceous lanceolate acute attenuated at the base paleaceo-hirsute on both sides, costa sparingly paleaceous beneath, sori almost biserial irregular, involucre reniform entire sparingly pilose."—*Brack. Fil. U. S. Expl. Exp.* p. 214. t. 29.

Hab. Organ Mountains, Brazil, *Brackenridge*.—This is the only instance, as far as I know, of any *Oleandra* having been met with in any part of Brazil. The species found in the adjacent region of Guiana might have been expected here, the *O. nodosa*. And, indeed, the caudex and the setaceous spreading paleæ of this (well represented in the figure quoted above) quite accord with that species; the fronds are narrower, less satiny; the sori are in a nearly single series (as in *O. neriiiformis*); and there is a degree of pubescence or hairiness, as in my var. *pilosa* of the last-named species. It is hence an instructive plant, and may tend to show that when we have a more intimate acquaintance with the genus, it will have to be reduced in its amount of species still more than I have ventured to do here. The nearest affinity of this is with my Madagascar form of *O. nodosa*, but there the caudex more resembles that of *O. neriiiformis*.

4. *O. Wallichii*, Pr.; caudex creeping rooting branched thicker than a goose-quill densely clothed with subulate crisped ferruginous spreading and often reflexed scales thickly tufted at the extremity of the branches, stipites distant  $\frac{1}{2}$  an inch to 2 inches long and sometimes paleaceous jointed close to the base so that the very short lower articulation is concealed among the scales, fronds 6–12–14 inches long membranaceous subpellucid opaque on the surface pilosulous subelliptical-oblong, the sides parallel, the base often obtuse and rounded, the apex suddenly and sharply acuminate, sori compact almost imbricated in a continuous line or chain close to and parallel with the costa on each side, involucre reniform ciliated opening towards the margin.—Aspid. Wallichii, *Hook. Ex. Fl. i. p. 6. t. 5. Kze. in Schk. Fil. Suppl. p. 36. 19. Oleandra Wallichii, Tent. Pterid. p. 78. Neurospora asplenoides, Don, Prodr. Fl. Nep. p. 6.*

Hab. Nepal, *Wallich, in Herb.* North of India, among the mountains, from Simla and Kumaon (alt. 6500 feet) in the West, to Boutan in the East, *Griffith, Strachey and Winterbottom, Col. Bates, Hooker fil. and Thomson* (who find a large form at Lachen,  $2\frac{1}{2}$  inches wide, with the irregularly scattered sori near, but not close to, the costa). Assam and Khasya, *Griffith, Hooker fil. and Thomson*. A most delicate var. is found by Mr. Oakley in Himalaya, alt. 7000 feet, 5–6 inches long, 1 inch wide, exactly elliptic-oblong, quite transparent, having a sharp narrow point. One of *Col. Bates's* specimens from Simla, has the sori apart and forming an irregular series at the distance of a line or more from the costa. Java, *De Vriese and Teijsmann, n. 78?*—This is very distinct in the crisped scales of the caudex, the subelliptical form and membranous texture of the frond, and, generally, in the very close proximity of the sori to the costa.

5. *O. Cumingii*, J. Sm.; caudex apparently creeping scarcely so thick as a writing-pen clothed with close-pressed subulate imbricated scales, stipites subterminal and subaggregated 2–3 inches long slightly downy articulated within  $\frac{1}{2}$ – $\frac{3}{4}$  of an inch from the base, fronds 1–1 $\frac{1}{2}$  foot long firm-membranaceous elongato-lanceolate acuminate very much attenuated and gradually decurrent at the base pubescenti-villos

on the costa and veins, sori rather large forming a single and scarcely interrupted line very near to and on each side the costa.—*J. Sm. in Hook. Journ. Bot.* iii. p. 413 (*name only*). *Pr. Epimel. Bot.* p. 41.— $\beta$ , *longipes*; stipites 4–6 inches long inferior articulation 1–2½ inches long, fronds less attenuated at the base, sori quite costal in one instance irregularly scattered at a distance from the costa.— $\gamma$ , *Taihitensis*; scales of the caudex (on a small portion only in my possession) laxly patent, stipites 3–4 inches long and as well as the costa very fuscopubescent and slightly paleaceous, fronds large 2–3 feet long 1½–2 inches broad membranaceous much attenuated at the base, sori in very irregular wavy lines more than ¼ of an inch from the costa. *An O. Sibbaldii*, “*Grev.?*,” *from Tahiti* (noticed by Kunze in his description of *O. hirtella*).

Hab. Luzon, *Cuming*, n. 60.  $\beta$ , Mergui, on the ground, *Parish*, n. 59. Moulemein, on rocky hills, *Thos. Lobb*. Assam, *Griffith*.—I retain this species with great hesitation, and I have referred other Indian forms to it with no less doubt. The var.  $\gamma$  is perhaps the most peculiar in size, texture, and clothing, and especially in the spreading scales of the caudex; nevertheless Mr. Moore has expressed his opinion in my herbarium, that it is identical with *O. Cumingii*, and I am far from thinking he is wrong. If so, there is less reliance to be put on the paleaceous covering of the caudex than I had believed; the texture and size of the frond are very variable in all the species, and it is quite certain that no dependence can be placed on the exact arrangement and relative position of the sori with the costa.

With the feelings of doubt I have expressed as to the specific identity of many of the individuals of the genus I shall only refer to the following, of which I have no certain knowledge:—*O. macrocarpa*, *Pr. Epimel. Bot.* p. 41 (Luzon, *Cuming*, n. 60, in part). *O. phyllarthron*, *Pr.; Aspid.*, Kze. in *Bot. Zeit.* vi. p. 237; *O. musafolia*, *Pr.; Aspid.*, *Bl. Enum.* p. 141, Java. *A. Moritzii*, *Pr.; Aspid.* Kze. in *Bot. Zeit.* vi. p. 238, Java. *O. tomatopus*, *Pr.; Aspid.*, Kunze, in *Bot. Zeit.* vi. p. 238, Java.

## 6. FADYENIA, *Hook.*

(HOOK. GEN. FIL. TAB. LVIII. B. *Aspidium*, *Hook. et Grev. (olim).*)

*Sori* subrotund, dorsal. *Involucre* large, orbicular or subhippocrepiform, subpeltate, emarginate at the base, attached to an elongated receptacle, nearly free all round at the margin, parallel with the costa, directed towards the apex of the frond. *Veins* anastomosing, with free veinlets only at the margin in the sterile fronds. *Areoles* few and large (one series) in the fertile fronds, and those including a free sori-ferous veinlet.—*Fern of the West Indies*. Caudex short, ascending. Fronds 6–8 inches long, simple, tufted, dimor-

*phous*; sterile ones *lanceolate*, much tapering at both extremities, *proliferous* and *rooting* at the apex, and *decumbent*; fertile fronds *erect*, *spatulate*, *obtuse*, tapering below into a winged *stipes*.

*F. prolifera*, Hook. Gen. Fil. t. l. c. *Fée*, Gen. Fil. p. 317. *J. Sm. Cat. Cult. Ferns*, p. 54. Hook. Fil. Exot. plate 36. *Aspidium proliferum*, Hook. et Grev. Ic. Fil. t. 96 (not Br.). *Aspidium Fadyenii*, Metten. *Aspid.* p. 35. *Polystichum Grevilleanum*, Pr. Tent. Pterid. p. 82.

Hab. Jamaica, high and shady woods, *Sloane*, *M'Fadyen*, *Dr. Alex. Prior*. Mountains of Cuba, *C. Wright*.—A very remarkable Fern, so unlike anything in the *Nephrodium*-group, that I cannot but think it deserves to rank as a genus. In our figures in 'Icones Filicum' the involucre is incorrectly represented (from the dried specimens) quite orbicular and peltate.

## 7. ONOCLEA, Metten.

ONOCLEA and STRUTHIOPTERIS of recent authors.

(ONOCLEA, HOOK. GEN. FIL. TAB. LXXII. *Ragiopteris*, Pr. Calypterium, Bernh. *Struthiopteris*, Willd. HOOK. GEN. FIL. TAB. LXIX. *Osmundæ* sp., Linn.)

*Sori* dorsal on the changed and contracted pinnæ or pinnales of the fertile fronds, and quite concealed by their revolute margins. *Involucres* very thin, delicate, hemispherical or half-cupshaped, originating at the inferior side of the sorus, or wanting.—*Caudex erect* or *creeping*. Fronds *stipitate*, *dimorphous*, *pinnate* or *pinnatifid* with lobed pinnæ or segments. *Veins* free or *anastomosing*.—§ I. ONOCLEA, L. Sw. Fertile fronds *bipinnate*, *pinnales recurvato-globose*, *involucres pisiform* manifest. *Veins* of the fertile fronds *copiously anastomosing*.—§ II. STRUTHIOPTERIS. Fertile fronds *pinnate*, *pinnæ flattish* or *torulose*. *Veins* all free, *pinnated*. *Involucres* very *glacius*.

1. O. (*Euonoclea*) *sensibilis*, Linn. Sp. Pl. p. 1517; Willd. Sp. Pl. 5. p. 287. Sw. Syn. Fil. p. 110. Willd. Sp. Pl. v. p. 288. Schk. Fil. p. 95. t. 102. Mich. Am. p. 272. Hook. Fl. Bor. Am. ii. p. 62. Asa Gray, Man. Bot. Illustr. p. 599. *Ragiopteris onocleoides*, Pr. Tent. Pterid. p. 96. t. 3. f. 9. 10 (fertile frond only).—Var.  $\beta$ , *obtusiloba*, Hook. l. c.; lobes short very obtuse, pinnæ subpinnate at the base.—*Onoclea obtusiloba*, Schk. Fil. p. 95. t. 103. Pursh, Am. ii. p. 665. *Ragiopteris*, Pr. Tent. Pterid. p. 96.

Hab. North America : abundant in the United States, from Florida to the extreme North ; Canada, from Lake Huron to the Saskatchewan (*β*. Pennsylvania and New Orleans, *Drummond*). It has not yet been detected on the Pacific side of North America, which is the more remarkable because it exists on the opposite coasts of North China ; Amur, *Maximowicz*, and Manchuria, *Wilford*.

A solitary species only is known of this section of *Onoclea*.

(Section *Struthiopteris*.)

2. *O. (Struthiopteris) Germanica*, Willd. ; fronds 1–3 feet long broad-lanceolate long-attenuated at the base, fertile pinnæ short much contracted linear-terete submoniliform lobed and torn at the margin, involucres cup-shaped very fragile and soon obsolete.—*Willd. Sp. Pl.* v. p. 288. *Asa Gray, Man. of Bot. Ill.* p. 590. *Osmunda Struthiopteris*, *Linn. Sp. Pl.* p. 1522. *Onoclea Struthiopteris*, *Sw. Syn. Fil.* p. 111. *Fl. Dan. t.* 169. *Schk. Fil. p.* 97. *t.* 105. *Metten. Fil. Hort. Lips. p.* 97. *t.* 17. *ff.* 11–15. *Onoclea nodulosa*, *Schk. Fil. p.* 96. *t.* 104. *Struthiopteris Pennsylvanica*, *Willd. Sp. Pl.* v. p. 289.

Hab. Northern Europe, Scandinavia and south to Bohemia and Prussia. North Asia : Altai, Manchuria, (*Wilford*) ; Amur, *Maximowicz*. North America : Pennsylvania to Canada and Lake Winnipeg.—Few genera of Ferns have found a more unsatisfactory resting-place than *Struthiopteris* and *Onoclea*. The former genus was established by Linnæus, and placed near *Ophioglossum* ; *Onoclea* he ranked with *Osmunda*, and other equally dissimilar Ferns. Willdenow, in 1809, constituted a separate genus of *Struthiopteris*, arranging the two, however, next to each other ; and the two genera have remained distinct till 1856, when Mettenius discovered an involucre in *Onoclea*, to which the presence of a special involucre had always been denied ; “indusium inferum dimidiatum basi receptaculi et parenchymati circa basin receptaculi adnatum, fornicatum, margine externe liberum.” This discovery Dr. Hooker has satisfactorily confirmed on the living plant, as far as *O. Germanica* is concerned. Mettenius therefore again unites the two, placing them, on account of the inferior involucre, between *Cistopteris* and *Woodsia*, with which they have certainly no natural affinity. It is to be observed that the real structure of this involucre is very difficult to be detected, on account of its fragile nature and the tough and dry substance of the portion of the frond which encloses it.

3. *O. (Struthiopteris) orientalis*, Hook. ; fronds 1–2½ feet long ovato-oblong not attenuated below, fertile fronds oblong often 2 feet long contracted broad linear-oblong flattened 2-edged the refracted margins at first covering the whole back of the frond dark purple-brown glossy involucriform entire at the edge at length spreading torn at the margin and exposing the fructification which is eventually confluent in a continuous line, stipes rachis and costa deciduously paleaceous.—*Hook. 2d Cent. of Ferns, tab.* 4. *Struthiopteris Germanica*, *Eaton, in Wright's Herb. of V. S. N. Pacif. Expl. Exp. of Ringgold and Rodgers (not of Willd.)*.

Hab. Sikkim-Himalaya, elev. 12,000 feet, *Hooker fil. and Thomson*. Assam, *Simons*. Hakodadi, Japan, *C. Wright*.—A most distinct species, with the sterile pinnæ exactly as in *O. Germanica*, but extremely different in the form and size of the fertile ones, not in the least terete or torulose, but remarkably flattened; and with the reflexed or rather refracted margin glossy and membranaceous. Some of the fertile pinnæ are 4 inches long, and, when the scarious margin is, in age, spread open, with its lacerated edge,  $\frac{1}{2}$  an inch wide. Neither in the old nor young (dried) state of the plant have I found the trace of a proper involucre. Still I cannot hesitate about placing the plant in its present genus.—The three species have a strong natural affinity with each, but with no other Ferns.

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At p. 70, after *Nephrodium stipellatum*, the following species should have been placed:—

16\*. *N. (Eunephrodium) refractum*, Hook.; caudex erect, stipites  $1\frac{1}{2}$  foot and more long angular glossy perfectly glabrous (as is the whole plant), fronds 15 inches long subcoriaceous-membranaceous subpellucid glossy above hastato-ovate acuminate pinnated (pinnatifid at the apex), pinnæ 4–5 inches long  $\frac{1}{2}$  an inch broad horizontally patent the lower ones the longest and singularly deflexed especially the lowest pair, all of them oblong-lanceolate acuminate the margin lobato-pinnatifid their base unequal, the lower pinnæ especially cut off as it were at the inferior base, bearing an auricle above appressed to the rachis, veinlets about five pairs all of them united each bearing a purplish sorus in the middle over the whole frond, involucre small cordate dark-purple. (TAB. CCLII.)—*Polypodium refractum*, *Fisch. et Mey. Kze. in Linnæa*, xxiii. p. 321. *Regel, in Linnæa*, xxviii. p. 376. *Goniopteris*, *J. Sm. Cat. Cult. Ferns*, p. 20. *Aspidium*, “*A. Braun, Ind. Sem. Hort. Berol. 1836.*” *Metten. Aspid. p.* 100.

Hab. “Brazil.”—I was wholly unacquainted with this most distinct Fern till after the printing of the preceding pages of *Aspidiæ*, and my attention is now directed to it in the stove of the Royal Gardens, bearing unmistakable fructification of *Eunephrodium*, though no author appears to have described the presence of an involucre. The form as well as the texture of the frond, with the singularly refracted and elongated lower pinnæ, are very peculiar. The fructifications are placed with great regularity in the middle of each veinlet over the entire frond, forming a series of inverted V's, corresponding with every lobule of the margin of the frond. The species appears to be unknown to authors except as a garden plant, introduced, it would appear, by Dr. Fischer, from Brazil. Distinct as it is from any known *Eunephrodium*, it has its analogue in our *Nephrod.* (*Lastrea*) *macrotis*, p. 86 of this volume, Tab. CCXLII. B, from Peru; but, besides the different venation, *N. macrotis* is a much larger plant, with much longer auricles, and the rachis, and costæ, and involucres, are very hairy; the inferior pinnæ are similarly refracted. Mrs. Walker informs me that this species bears bulbils in her Fernery at Enfield.

SUBORD. IX.—POLYPODIEÆ, *Pr.*

*Sori* subrotund, rarely oblong, *destitute of Involucre.*

1. POLYPODIUM, *Linn.*

(HOOK. GEN. FIL. TAB. LXIX. B. *Holcosorus*, *Moore*. *Grammitis*, *Sw.*, *et alior.*, *in part.* HOOK. GEN. FIL. TAB. LXXII. FIGS. 1-6. *Calymodon*, *Pr.* *Plectopteris*, *Fée.* *Adenophorus*, *Gaud.* *Ctenopteris*, *Bl.* *Kze.* *Monachosorum*, *Kze.* *Phegopteris*, *Pr.* *Arthropteris* *sp.*, *J. Sm.* *Cryptosorus*, *Fée.* *Goniopteris*, *Pr.* HOOK. GEN. FIL. TAB. XXXVIII. *Goniophlebium*, *Pr.* HOOK. GEN. FIL. TAB. LXX. B. *Craspedaria*, *Fée.* *Chrysopteris*, *Link.* *Marginaria*, *Pr.* *Bory?* HOOK. GEN. FIL. TAB. LI. *and* TAB. XIV. (venation in both figures imperfect.) *Dictyopteris*, *Pr.* HOOK. GEN. FIL. TAB. LXXI. B. *Campyloneurum*, *Pr.* HOOK. GEN. FIL. TAB. LXXI. A. *Pleopeltis*, *Humb. et Bonpl.* HOOK. GEN. FIL. TAB. XVIII. *Phlebodium*, *Pr.*, *J. Sm.* HOOK. GEN. FIL. TAB. CXII. *Pleuridium*, *Fée.* *Phymatodes*, *Pr.* HOOK. GEN. FIL. TAB. XXIX. *Drynaria*, *Bory.* *Anaxetum*, *Schott.* *Microsorium*, *Link.* *Aglaomorpha*, *Schott.* HOOK. GEN. FIL. TAB. XCI. *Psygmium*, *Pr.* *Niphobolus*, *Kaulf.* HOOK. GEN. FIL. TAB. LXXIII. *Colysis*, *Pr.* *Cyclophorus*, *Pr.* *Dipteris*, *Reinw.*)

*Sori* dorsal, usually subrotund, or more or less oblong. *Involucre* none. *Veins* free or variously anastomosing, with *sori* terminal or medial.—Ferns of very varied form, size, and structure, simple or compound, inhabiting the tropics, as well as temperate and even cold regions. *Caudex* erect or creeping.

The above generic synonyms of what we here bring under the genus *Polypodium* are by no means all that might be included, but which are, like many of the above, rejected by the ablest pteridologists; and they will many of them be referred to under the synonymy of the species.

§ EUPOLYPODIUM.—*Sori* subrotund or oblong, terminal or more rarely on the back of the veins. *Veins* free, rarely partially anastomosing. *Fronds* simple or very frequently pinnatifid, or pinnate, or decompound. *Caudex* caespitose, erect, or creeping. *Stipes* not unfrequently jointed at the base upon the caudex. *Polypodium*, *Pr.*, including *Phegopteris*\* of authors.

\* Fern-authors are divided as to the propriety of considering *Phegopteris* a



\* *Fronds simple and entire (not distinctly lobed or divided). Sori not unfrequently oblong; hence, including species of Grammitis of authors, 1-27.*

1. *P. (Eupolypodium) bisulcatum*, Hook.; caudex long creeping clothed with subulate scales, fronds distant very coriaceous 8-10 inches long less than a line wide linear obtusely five-angled (two longitudinal soriferous furrows at the back) acuminate gradually tapering into a very short stipes articulated on the caudex, veins quite obsolete, sori oval prominent.—*Hook. Ic. Plant. t. 998 (or Cent. of Ferns, t. 98). Holcosorus, Moore, Ind. Fil. p. 29.*

Hab. Borneo, near Sarawak, *Thos. Lobb*.—A very remarkable species, of which I have seen no specimens but those of Mr. Lobb. The fronds resemble the culms of some very rigid *Juncus*.

2. *P. (Eupolypodium) marginellum*, Sw.; caudex small erect or ascending rooting paleaceous above with glossy brown small lanceolate scales, stipites 1-3 lines long caespitose pilose, fronds firm subcoriaceous 3 inches to a span long 2 lines to  $\frac{1}{2}$  an inch wide linear spatulate and obtuse or linear-lanceolate and more or less acute below gradually tapering into the stipes glabrous entire or with a few hairs on the back and ciliated pale beneath with a narrow almost black callous margin, fertile in the upper half or often for its whole length, veins oblique simple, sori copious oval approximate forming two almost uninterrupted lines nearer the costa than the margin.—*Sw. Fl. Ind. Occ. p. 1631. Metten. Polypod. p. 34. Grammitis, Sw. Syn. Fil. p. 22. Willd. Sp. Pl. v. p. 139. Schk. Fil. p. 8. t. 7. Mecosorus, Kl. in Linnaea, xx. p. 405. Grammitis limbata, Fée, Gen. Fil. p. 233, 6me Mém. Foug. p. 6. t. 5. f. 1.*

Hab. Tropical America. West Indies: Jamaica, *Swartz, Bancroft, Wilson; Guadeloupe, L'Hermier*. Venezuela, *Schomburgk, Fendler, n. 256. Porto Rico, Schwanecke*. British Guiana, *Richd. Schomburgk*. Near Tarapota, Eastern Peru, *Spruce, n. 4643 (Gram. nigro-limbata, Spruce, MS.)*. St. Helena, *Menzies; Diana's Peak, J. D. Hooker, Nuttall, and in Herb. nostr. ex Herb. Dicks.*—Schkuhr's figure well represents a small form of this plant, as does that of M. Fée, for the larger-sized specimens. Between this and *P. australe* (our n. 8) I can really point out no difference, save in the generally distinct but slender dark-coloured callose margin, best seen on the under side of the frond of the present species, and which suggested the specific name.

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distinct genus from the other free-veined species of *Polypodium*, which, indeed, Presl never intended, but a group or subsection, with the character "sori in dorso medio venarum venularumve." To me there appears to be no tangible character. They are the most compound species of *Eupolypodium*. Mettenius, so cautious of multiplying genera needlessly, nevertheless retains *Phegopteris*. Mr. Moore, on the other hand, unites it with *Eupolypodium*.

3. P. (Eupolypodium) *pseudo-grammitis*, Gaud. ; caudices slender filiform creeping crowded and entangled (so that the stipites in the mass appear tufted) short  $\frac{1}{2}$  an inch or little more long, fronds subcoriaceous opaque rigid 2-5 inches long 1 line wide linear obtusely dentato-sinuate gradually attenuated at the base into the stipes, costa prominent beneath, veins immersed in the substance of the frond, sori very distant globose or oval prominent and generally upon a projecting angle or tooth of the frond and occupying the whole space between the costa and the margin.—*Gaud. in Freyc. Voy. Bot. p. 345. Hook. et Arn. Bot. of Beech. Voy. p. 103. t. 21. B. P. Kaulfussii, Pr. Tent. Pterid. p. 178. Metten. Polyp. p. 35. Grammitis tenella, Kaulfs. En. Fil. p. 84. Kze. Annal. xiv. t. 9. f. 1.*

Hab. Sandwich Islands, *Gaudichaud, Beechey, Brackenridge*.—A well-marked species, peculiar, I believe, to the Sandwich Islands. We had noticed in the 'Botany of Beechey's Voyage,' that this Fern is very tender and membranaceous. It is so, Brackenridge remarks, "when growing in shady localities, but in open and exposed localities the specimens are rigid and coriaceous," as shown in the specimens of that author sent me by Mr. Eaton.

4. P. (Eupolypodium) *gramineum*, Sw. ; caudex very small clothed with ovato-lanceolate rufous scales densely radiculose below, stipites in fascicles of from 3-5 slender filiform 1-2 inches long pubescenti-scaberulous, fronds 2-4 inches long  $1\frac{1}{2}$  line wide firm coriaceous-membranaceous quite entire obtusely acuminate the base cuneate, veins slightly prominent erect-patent forked the superior branch bearing the sorus which is nearly parallel with the costa and occupying almost the whole space between the costa and the margin and more or less of the whole length of the frond.—*Sw. Fl. Ind. Occ. p. 1629. Metten. Polypod. p. 35. Schk. Fil. p. 8. t. 7 (very good). Grammitis linearis, Sw. Syn. Fil. p. 21 (excl. the Syn. of Asplenium angustifolium, Jacq.). Mecosorus nudus, Kl. in Linnaea, xx. p. 405 (and in Herb. nostr.). Polypod., Metten. Polypod. p. 37. Grammitis caespitosa, Bl. En. Fil. Jav. p. 196. t. 46. f. 1.*

Hab. Jamaica, *Jacquin, Bancroft*. St. Vincent, *L. Guilding*. British Guiana, *R. Schomburgk*. Java, *Blume*.—Quite a good species, faithfully represented by Schkuhr, but strangely confounded by Swartz and his followers with the *Asplenium angustifolium* of Jacq. (Ic. Pl. Rar. t. 199), which is *Polypod. australe*, from the Straits of Magellan! Klotzsch's *Mecosorus nudus* is identical with this. Mettenius gives St. Helena as a locality for this species, but he does not say upon what authority. Still more remarkable is the fact that this same tropical American species I have received from Blume as his "*Grammitis pusilla*,  $\beta$ . *alpestris*," so named in error, for the plant is clearly his *Grammitis caespitosa*,

above quoted. It is identical with our *Pol. gramineum*, even to the peculiar pubescence of the elongated stipes.

5. P. (Eupolypodium) *Jungermannioides*, Kl.; "fronds caespitose erect small ligulate obtuse slightly repand attenuated towards the base on both sides rufescenti-pilose, rachis and short stipes blackish, veins pinnated, branches shortly forked at the apex, sori moderate in size yellowish-brown." *Kl. in Linnæa*, xx. p. 373. *Metten. Polypod.* p. 35. *Grammitis repanda*, Kze. in *Metten. Pl. Lechler.* p. 9. (*fide Metten.*)

Hab. Merida, Columbia, *Moritz*, n. 312. Peru, *Lechler*, *Philippi*.—Klotzsch and Mettenius have each given a brief character of this, but unfortunately no observations on the affinity with other species. I therefore place it, as Mettenius has done, next to *P. gramineum*.

6. P. (Eupolypodium) *hirtellum*, Bl.; "fronds shortly stipitate linear rather obtuse attenuate at the base subentire membranaceous nearly veinless hairy on both sides, sori subrotund at length confluent, caudex caespitose paleaceous." *Bl. En. Fil. Jav.* p. 123. *Metten. Polypod.* p. 35 (*excl. Gr. nana, Fée*). *Grammitis pusilla*, *Bl. En. Fil. Jav.* p. 109. f. 4. 5. *a. and β. alpestris (excl. f. 6, which is P. lasiosorum, nobis.)*

Hab. Java, *Blume*.—My original specimens of this plant from Blume sufficiently correspond with his figure, and tolerably so with his description. The fronds are 2-3 inches long, lanceolate or subspathulate rather than linear, tapering gradually into a very short stipes, everywhere clothed with rather long ferruginous hairs; veins forked. The var. *γ. lasiosorum*, of which I also possess specimens from the author, I am disposed to consider a distinct species in consequence of its smaller size and long stipes.

7. P. (Eupolypodium) *lasiosorum*, Hook.; caudex very small indistinct radiculoso-caespitose, stipites tufted  $\frac{1}{2}$  an inch and rather more long slender filiform villous with patent ferruginous hairs, fronds subcoriaceo-membranaceous spathulato-lanceolate obtuse quite entire much attenuated at the base rather densely villous and ciliated with long patent soft ferruginous hairs more or less deciduous in age, veins not discernible, sori globose on all my specimens occupying the upper half of the frond prominent crowded in two lines close to the costa, copious hairs are intermixed with the capsules.—*Grammitis pusilla*, *γ. lasiosorum*, *Bl. En. Fil. Jav.* p. 110. f. 6. *Gr. nana*, *Fée*, 6me *Mém.* p. 7. t. 6. f. 1.

Hab. Java, *Blume*.—Blume's figure represents the plant nearly twice the size of my specimens, to which it is quite likely to attain; in all else the figure is very characteristic; but there is no analysis.

8. *P. (Eupolypodium) australe*, Metten.; caudex small suberect (ascending, *Metten.* and *Kunze*, who represent it horizontally creeping; many caudices seem to grow together and form a densely rooting mass) scaly, stipites tufted 1-2-3 lines rarely 1 inch long, fronds subcoriaceous  $\frac{1}{2}$  an inch to 6 inches long, the smallest generally spatulate and very coriaceous, the larger ones linear-lanceolate 2-4 lines wide much attenuated at the base and there as well as on the stipites deciduously hairy, the rest at least in maturity glabrous, the margin sometimes slightly sinuose, veins erectopatent forked, sori forming two lines occupying each the upper branch of the vein oval-oblong or even though rarely quite linear.—*Metten. Polypod. p. 36.* Grammitis Billardieri, *Willd. Sp. Pl. v. p. 139.* *Kze. Annal. Pteridogr. p. 15. t. 9. f. 2.* Gr. australis, *Br. Prodr. p. 2.* Gr. Magellanica, *Desv. Journ. Bot. iii. p. 275. t. 10. f. 2.* *Fée, Gen. t. 20. f. 3.* Asplenium angustifolium, *Jacq. Coll. i. p. 121. Ic. Pl. Rar. t. 199.* Gram. nana, *Brack. Fil. U. S. Expl. Exp. p. 1.* Gr. crassa, *Fée. Gen. Fil. p. 225.* Gram. australis, rigida, et humilis, *Hombr. et Jacquinot, Voy. au Pôle Sud, Crypt. Pl. 2. ff. F. G. and H.*

Hab. South Australia (Port Jackson), *Brown.* North-east Australia, Mount Lindsay, *J. Sim.* Tasmania, *Labillardière, Brown*, and all succeeding travellers, often at elevations of 4000 feet (*R. Gunn*). New Zealand, abundant, *all travellers*, to the extreme south. Lord Auckland's and Campbell's Islands, *J. D. Hooker.* Staten Land, *Menzies, 1787.* Tristan d'Acunha, *Carmichael.* Falkland Islands, *Darwin.* Extreme south of South America: Straits of Magellan (*Jacquin*); Port Famine, *Capt. Ph. King*; Hermite Island (trunks of trees close to the sea, ascends to 1500 feet), *Hook. fil.*; Lima, *Cuning, n. 1052*, undistinguishable from the Antarctic specimens, and I possess a specimen from Madagascar (sterile) which appears to be the same.—I have already, under *P. marginellum*, Sw., alluded to the close affinity of this with that species. Like that, it is variable in size and in form from the dwarf, perfectly compacted, and exactly spatulate fronds, as it usually grows upon rocks, to the linear-lanceolate ones of 5-6 inches in length, as it commonly grows on trees.

9. *P. (Eupolypodium) parasiticum*, Mett.; "caudex ascending, stipes 2-4 lines long, fronds coriaceous sparingly clothed with black hairs beneath  $1\frac{1}{2}$ - $2\frac{1}{2}$  inches long lanceolate rather obtuse entire or repand, veins immersed forked extending to the margin, sori short oblong on the superior branch in the middle between the costa and the margin on a rather prominent receptacle having a few black setae."—*Metten. Polypod. p. 36.* Grammitis attenuata, *Kze., in Linnæa, xxiv. p. 251.*

Hab. Nilgiri Hills, *Schmid, Beddome, n. 107.* Ceylon, *Gardner, n. 1283,*

var.?, with glabrous and pubescenti-hirsute stipites.—I have very little doubt, though I have seen no authentic specimens, that Mr. Beddome's plant is the same as that of Schmid, and possibly the same as *P. pilosiusculum* of Java.

10. *P. (Eupolypodium) adpersum*, Bl. En.; "fronds sessile linear obtuse attenuated at the base subrepand coriaceous glabrous nearly veinless (the figure represents the veins very strong) sparingly nigro-punctate, sori subrotund parallel with the costa, caudex creeping squamose." Bl.—Metten. *Polypod.* p. 36. *Grammitis adpersa*, Bl. En. *Fil. Jav.* p. 115. *t.* 48. *f.* 2.

Hab. Java, *Blume*.—The author's figure represents an ascending caudex, with rather distant, lanceolate, obtuse fronds, 3–5 inches long, tapering at the base, with very conspicuous forked veins (at least as seen on the upper side), clavate at the apex of the branches. I am not acquainted with the species.

11. *P. (Eupolypodium) pilosiusculum*, Hook.; "fronds stipitate linear rather obtuse or obtusely acuminate subrepand coriaceous veinless moderately hairy on both sides and on the stipes, sori elliptical scattered."—*Grammitis*, Bl. En. *Fil. Jav.* p. 115. *Fil. Jav.* p. 107. *t.* 46. *f.* 2. *Metten. Polypod.* p. 36.

Hab. On trees, Java, *Blume*. "3–4 inches high. Caudex creeping (?). Stipes  $\frac{1}{2}$ –1 inch long. Fronds  $2\frac{1}{2}$  inches long, 3 lines wide, linear or narrow-lanceolate, obtuse at the apex, attenuated at the base, coriaceous."—The figure is a very good representation of our *P. parasiticum* from the Nilghiris. But that and the description are too imperfect to enable me to attempt confidently to refer it to any species known to me.

12. *P. (Eupolypodium) sessilifolium*, Hook.; caudex small erect or ascending scaly, stipites scarcely any, fronds tufted membranaceous firm 3–8–9 inches long 2–3 lines wide linear scarcely acuminate obtuse attenuated at the base, veins oblique approximate simple, sori oblong parallel with the costa in lines or series intermediate between the costa and the margin. (TAB. CCLXXII. A.)

Hab. Luzon, *Cuming*, n. 382 (one specimen with a very indistinct stipes). Penang, *Sir W. Norris*. Java, *Blume*, mixed with his *Pol. hirtellum*.—The smaller fronds of this a good deal resemble those of *P. gramineum*, but they altogether want the decided, even long, stipes of that species.

13. *P. (Eupolypodium) Poeppigianum*, Metten.; "rhizome ascending caespitose clothed with lanceolate acuminate scales, fronds 1–1 $\frac{1}{2}$  line long 2 $\frac{1}{4}$  lines wide coriaceous glabrous spathulato-lanceolate obtuse, veins immersed, sori at the base of the superior branch of the veins shortly oblong subparallel with the costa at length covering the entire costa." *Metten. Polypod.* p. 37.

Hab. "Clefts of rocks in mountains of Hottentots' Holland," *Paeppig*.—I have seen nothing from South Africa I can refer to this, nor does there appear to be anything like it in Pappe and Rawson's *En. Fil. Cap.*

14. P. (*Eupolypodium*) *fasciatum*, Metten.; caudex truly repent thick as a crow's or even a goose's quill paleaceous with subsphaganeous scales sparingly rooting, stipites 1-1½ inch long more or less distant black or blackish sometimes deciduously hairy, fronds coriaceous everywhere glabrous or with a few scattered hairs near the base and on the margin 12-16 inches long subflexuose quite entire rather obtusely acuminate long and gradually tapering at the base upon the stipes, costa prominent beneath above having a sunken line or furrow, veins sunk once forked the upper branch bearing the sorus at the base near the costa so that the close-placed oval oblique sori form two lines or series close to the costa occupying chiefly the upper part of the frond.—*Metten. Polypod. p. 37. Grammitis, Bl. En. Fil. Jav. p. 117. t. 49. f. 1 (very good). Gr. longa, Fée, 8me Mém. Foug. p. 6. t. 4. f. 1.*

Hab. Java, *Blume, De Vriese and Teijsmann, n. 6*, on mountains, alt. 3000-5000 feet, *Thos. Lobb, n. 271*.—Blume well observes of this, that the younger sori are more narrow and oblong than the mature ones.

15. P. (*Eupolypodium*) *Reinwardtii*, Metten.?<sup>\*</sup>; "fronds stipitate spatulato-lanceolate obtuse repand submembranaceous furcato-venose plane on both sides and on the stipes pilose, sori oval approximate to the costa and subparallel with it, caudex paleaceous." *Bl.*—*Grammitis, Fil. Jav. p. 114. t. 48. f. 1. Polypod., Metten. Polypod. p. 37 (excl. Gram. hirta<sup>?</sup>, J. Sm.).*

Hab. Java, *Blume, Zollinger, n. 1270*.—Mettenius refers J. Smith's *Grammitis hirta* to this species, but our specimens of that plant do not accord with the figure of this in Blume, which exhibits a shorter and broader frond, with simple veins (parallelo-venulose).

16. P. (*Eupolypodium*) *Zeylanicum*, Metten.; caudex creeping as thick as a duck's quill rooting branched clothed with sphaganeous scales, stipites scattered but approximate ½-1 inch long black patently hispid, fronds 6-10 inches long ⅓ of an inch wide submembranaceous-coriaceous subpellucid linear-lanceolate repando-dentate especially in the upper half glabrous or subciliate and with the remains of hairs here and there on the surface sharply acuminate, below gradually attenuated into the stipes, costa rather slender slightly prominent on both sides, veins rather distant moderately patent

once forked near or above the middle not extending to the margin, upper branch bearing the sorus chiefly in the upper half of the frond obliquely patent in a line halfway between the costa and the margin and a little distant from each other. (TAB. CCLXXII. B.)—*Metten. Polypod. p. 38.* *Grammitis Zeylanica, Fée, Gen. Fil. p. 234.*

Hab. Ceylon, *Mrs. Genl. Walker, Gardner, n. 1138, 1283/1.*—Allied to, but truly distinct from, *P. fasciatum*, in the outline of the frond, in the presence of teeth at the margin, and in the shape and position of the sori.

17. *P. (Eupolypodium) hirtum*, Hook. (*an Metten.?*); caudex small ascending copiously fibroso-radiculose scaly above, stipites tufted black 1–1½ inch long villous with spreading brown hairs, fronds firm opaque-membranaceous 3–4 or more inches long ⅓ of an inch wide linear-oblong obtuse quite entire at the margin moderately attenuated at the base ciliated and more or less villous with long brown hairs, veins spreading forked near the base, upper branch short soriferous, sori subglobose in very regular series close to the costa. (TAB. CCLXXIII. A.)—*Metten. Polypod. p. 38?* *Grammitis hirta, J. Sm. in Hook. Journ. Bot. iii. p. 394 (no description or character).* *Grammitis hirta, Bl. En. Fil. Jav. p. 111. t. 46. f. 1?* (*veins too much branched*). *Grammitis setosa, Bl. En. Fil. Jav. p. 116. t. 48. f. 3 (non Pr.), and Gr. pubinervia?, Bl. l. c. t. 48. f. 4.*

Hab. Java, *Blume, Zollinger. Luzon, Cuming, n. 222.*—The smaller Indian grammitoid *Polypodia*, if I may so call them, are attended with great difficulty in their study; and neither the costly figures nor the descriptions of Blume tend so much as they ought to do to remove the difficulties. Mettenius refers to three of Blume's species as belonging to *P. hirtum*, Bl. That which bears the name of *hirtum* has the veins twice and thrice forked, or even pinnated, with divaricating branches, and Mettenius goes so far as to add (including all the three species of Blume) "hinc inde more Marginarise anastomosantes." Now the plant of Mr. J. Smith, identical with ours, has the veins with one, a single short, branch at the utmost, and in point of outline and sori it best accords with *Grammitis setosa* of Blume. But if that, as Mettenius would imply, has much branched and somewhat anastomosing veins, which I do not at all infer from Blume's description, then our plant is distinct; and it is this of which we here give a figure.

18. *P. (Eupolypodium) obscurum*, Metten.; "rhizome creeping, stipites 2–3 lines long, fronds coriaceous firm setose at the margin and costa 3–4 inches long 4 lines wide linear or lanceolate attenuated towards the base obtuse, veins immersed generally repeatedly forked, sori dorsal on the anterior lowest branch close to the costa, capsules setose."—*Metten. Polypod. p. 38.* *Grammitis obscura, Bl. En. Fil.*

*Jav. p.* 113. *t.* 50. *f.* 1 (to which Blume himself adds, fig. 2, "*β. angustata*; fronds narrower subentire shortly stipitate subpubescent on both sides, sori subrotund confluent." *Bl.*).

Hab. Java, "*Blume, Zollinger, n.* 1718."—With this I am unacquainted. I confess that Blume's var. *β.*, at *f.* 2, has the appearance of a different species, much smaller, and, judging from the figure, destitute of stipes. Mettenius does not include this under *P. obscurum*, and, as far as I can find, he omits it altogether. Mettenius, moreover, describes the veins as "*repetitum furcata*;" whereas Blume says "*venis simplicibus vel bifidis*." Probably Zollinger's plant may be different from Blume's.

19. *P. (Eupolypodium) setigerum*, *Bl.*; everywhere setoso-hirsute with long patent ferruginous hairs, caudex short ascending rather than creeping, stipites fasciculate 1–4 inches long, fronds membranaceous 3 inches to a span long  $\frac{1}{2}$ – $\frac{3}{4}$  of an inch wide elongato-lanceolate obtuse quite entire, veins pinnate two or three times forked, superior basal veinlets soriferous, sori approximate but not close, arranged in two very regular series near but not close to the costa.—*Bl. En. Fil. Jav. p.* 123 (not *Hook. et Arn. Bot. of Beech. Voy. p.* 103). *Hook. Ic. Pl. t.* 941 (or *Cent. of Ferns, t.* 41). *Metten. Polypod. p.* 38 (excl. *Syn. Hook. et Arn.*). *Grammitis fasciculata*, *Bl. En. Fil. Jav. p.* 112. *t.* 47. *f.* 2.

Hab. Epiphytal, on trunks and branches of trees, Java, *Blume (in Herb. nostr.)*. Bourbon (*Herb. nostr. from Herb. Mus. Par.*).—A beautiful species, quite ferruginous from the copious clothing of long tawny hairs, not confined to the margin. Stipes much elongated.

20. *P. (Eupolypodium) Hookeri*, *Brack.*; caudex very small ascending copiously radiculose, stipites  $\frac{1}{2}$ – $1\frac{1}{2}$  inch long patently setose, fronds 3–5 inches long scarcely  $\frac{1}{2}$  an inch wide subcoriaceous-membranaceous opaque narrow-lanceolate tapering at both extremities entire long-ciliated at the margin and setose on the costa, veins once or twice forked, sori very close in two compact lines at the costa with setae among the capsules.—*Brack. Fil. U. St. Expl. Exp. p.* 4 (according to the reference to *Hook. and Arn.*). *Polyp. setigerum*, *Hook. et Arn. Bot. of Beech. Voy. p.* 103. *t.* 21. *A.*

Hab. Sandwich Islands: Owhyhee, *Menzies*, *Bidwell*, *Beechey*, *Brackenridge*. Luzon, *Brackenridge*. Fiji Islands, *Milne*.—At the time Dr. Arnott and myself named this species *P. setigerum*, we were not aware that an allied, yet possibly different, species bore the same name in Blume. The texture is different, the fronds are much less villous, the sori are very crowded and placed so close to the costa on each side, that the two lines or series almost meet over the costa, the veins once or twice forked. The specimens I have received as *P. Hookeri*, *Brack.*, are undoubtedly *P. setigerum*, *Bl.*, not *Hook.* It is possible that, as *Brackenridge* gives Luzon (where I have never seen the *P. Hookeri*) as well as the Sand-



wich Islands as the locality for this species, he may have confounded the two ; and there is a very considerable affinity between them. He gives no description or note further than to say that *P. Hookeri* has the stipites, in many of the specimens, thrice the length of what I have figured, which corresponds with *P. setigerum*, Bl. I retain Brackenridge's name, because the authority for it is expressly our figure and description in the Bot. of Beechey's Voyage. Possibly the two are varieties of each other. If our figures and remarks shall only contribute towards the clearing up some of the difficulties attending the study of this most difficult group, we shall be content.

21. *P. (Eupolypodium) congener*, Hook. ; "fronds stipitate elongato-linear acuminate at both extremities very entire coriaceous veinless subrevolute at the margin glabrous above, beneath and the stipes subpubescent, sori rotundato-elliptical parallel with the costa, caudex repent."—*Grammitis congener*, Bl. *Fil. Jav. p.* 108. *t.* 46. *f.* 3. *a and b.*

Hab. Java, Blume.—Unknown to me. Except that the sori are more globose, the figure exhibits what looks very like a larger form of Blume's *Grammitis caespitosa*, represented on the same plate (our *Polyp. gramineum*).

22. *P. ? (Eupolypodium) punctatum*, Hook. ; "fronds linear entire obtuse, the margin nigro-punctate above, sori approximate and parallel with the costa."—*Grammitis, Raddi, Fil. Bras. p.* 11. *t.* 22. *bis. f.* 1. *Metten. Polypod. p.* 39.

Hab. Trunks of trees, Brazil, *Raddi*.—"Roots caespitose, very slender. Fronds 1½ inch or more long, about a line wide, subcoriaceous, glabrous. Sori near the apex of the frond. Stipes none." The sori are represented as linear-oblong and quite parallel with the costa. Unknown to me.

23. *P. (Eupolypodium) parietinum*, Kl. ; "fronds thick subspongiose on both sides sparingly rufescenti-pilose linear a little curved shortly attenuated at the apex obtuse (?) long attenuated at the base decurrent into the very short stipes, the margin slightly repand obsoletely costate, veins immersed laxly pinnated, the branches bi-rarely tri-furcate not extending to the margin, sori medial convex ferruginous in a simple series approximate to the margin, rhizome repent evanescently paleaceous, stipites crowded." *Kze.—Kl. in Linnaea, xx. p.* 373. *Kze. Fil. Schk. Suppl. 2. p.* 41. *f.* 17. *Metten. Polypod. p.* 39.

Hab. Columbia, *Moritz, n.* 253.—This is unknown to me.

24. *P. (Eupolypodium) Sprucei*, Hook. ; dwarf, caudex short subfiliform, stipites 1-2 lines long densely tufted, fronds scarcely more than an inch long membranaceous subpellucid bright-green oblong-subspathulate very obtuse quite entire crinite with long scattered fulvous spreading hairs,

costa slender zigzag, veins simple uppermost ones bearing globose terminal sori intermediate between the costa and the margin.—*Hook. 2d Cent. of Ferns, t. 10.*

Hab. Near Tarapota, Eastern Peru, *Spruce, n. 4746.*—Among the smallest of the species of true *Polypodium*, and a well marked one.

25. *P. (Eupolypodium) conforme*, Brack.; “caudex caespitose, stipites short, fronds linear-lanceolate obtuse attenuated at the base membranaceous glabrous slightly repand at the margin and as well as on the costa setose, veins forked, sori biserial approximate plane rounded arranged near the costa, sporangia echinate.”—*Brack. Fil. U. St. Expl. Exp. p. 4. t. 1. f. 2.*

Hab. Ovalau, Fiji Islands, on rocks and trees, alt. 2000 feet, *Brackenridge.*—“This differs from *P. subspathulatum* by the plane sori and their proximity to the costa; and from *P. Hookeri*, by the membranaceous, smooth (glabrous) fronds, and very short stipes.”—I am not in possession of sufficiently good specimens to form a decided opinion respecting this species, and *P. subspathulatum*, Brack. I fear that two species, or supposed species, are mixed in the *P. Hookeri*, Brack., the Malayan Island one, and that from the Sandwich Islands; and I have intimated that what I have from Mr. Eaton, as *P. conforme*, of Mr. Brackenridge, probably includes two species.

26. *P. (Eupolypodium) subspathulatum*, Brack.; “caudex caespitose, fronds few, sterile ones spatulate stipitate entire coriaceous glabrous, fertile ones linear-lanceolate attenuate at the base, the margin and stipes sparingly setose, veins forked, sori biserial distant subimmersed, nearly oval, sporangia echinate.”—*Brack. Fil. U. St. Expl. Exp. p. 8. t. 1 (but all the sori are represented globose).*

Hab. Tahiti, Society Islands, on trees, *Brackenridge.*—“Fronds few and very dissimilar in form; sterile ones, including the short stipes, 1–1½ inch long, spatulate in form, and destitute of setae; the fertile, 4–5 inches in length, which, with the margin of the frond, is sparsely beset with short and brown setae. Veins slender and forked, indistinctly visible on the upper side. The spatulate sterile fronds, and the fertile ones, with partially immersed sori, equidistant between the costa and margin, readily distinguish this from *P. Hookeri*.” I possess two specimens under this name; but one of those of *P. conforme*, from Mr. Eaton, sufficiently accords with the fertile frond above figured.

27. *P. (Eupolypodium) chrysolepis*, Hook.; caudex very long creeping flexuose paleaceous with patent squamose ferruginous subulate scales, stipites distant 1–2 inches long very scaly, fronds 2–3 inches long ½ an inch wide subcoriaceous lanceolate obtuse entire tapering gradually below into the stipes pale beneath everywhere clothed with ovate pelate long-acuminate aureo-nitent scales, veins rather obscure once or rarely twice forked free, sori large terminating a

superior veinlet subglobose deep ferruginous.—*Hook. Ic. Pl. t. 721.*

Hab. Andes of Quito, creeping among mosses, *Jameson*.—One of the handsomest of the simple-fronded *Eupolypodia*, the caudex, and fronds, and stipites being alike clothed with copious, bright, ferruginous, or rather aureo-nitent scales, quite unlike any other species known to me. It would appear to be very rare, for I have never received it from any other person than Dr. Jameson, and only on one occasion.

\*\* *Fronds pinnatifid (rarely once or twice forked) or occasionally more or less pinnated below.* (28-106.)

28. *P. (Eupolypodium) multifidum*, Bory; caudex minute almost none scarcely scaly radiculose below, stipites tufted a few lines long, fronds 2-3 inches long coriaceous opaque linear lanceolate costate entire tapering below into the short stipes simple or once or twice forked, veins oblique simple, sori between the margin and the costa oval or subrotund very prominent so large that the two series meet at the costa and overhang the margin so as to give an appearance of their being marginal.—*Bory, Voy. Isles d'Afr. ii. p. 103. t. 20. f. 2. Willd. Sp. Pl. v. p. 163. Kze. in Schk. Fil. Suppl. i. p. 90. t. 43. f. 1 (the principal figure copied from Bory). Metten. Polypod. vi. p. 230. Polyp. furcatum, Desv.*

Hab. Bourbon, *Bory (in Herb. nostr., from Herb. Mus. Par.)*.—A very rare species, apparently only gathered by Bory. My specimens have fronds mostly simple; they are sometimes forked with divaricating branches or segments, and these segments sometimes bifid.

29. *P. (Eupolypodium) furcatum*, Metten.; caudex small erect fibroso-radiculose, stipites densely tufted short 2-3 lines long, fronds subcoriaceous glabrous 3-4 inches long 1 line wide linear or narrow linear-lanceolate simple or far more generally forked scarcely acuminate below gradually attenuated into the short stipes entire or distantly dentato-sinuate, veins oblique distant simple ("rarely forked," *Metten.*), sori oval oblong large for the size of the frond.—*Metten. Polypod. p. 34. Grammitis, Hook. et Grev. Ic. Fil. i. p. 62. Hook. Gen. Fil. t. 72.*

Hab. Trunks of trees, British Guiana, *C. Parker*. French Guiana, *Le Prieur*. Janaraté river, Cachoeira, a tributary of the Amazon, *Spruce, n. 2452*.—Much resembling *P. multifidum*.

30. *P. (Eupolypodium) serrulatum*, Metten.; caudex a slender scaly more or less ascending and rooting rhizome, fronds small subhispid tufted (on very short stipites) 2-4-6 inches long 2-3 lines wide more or less curved or flexuose

linear attenuated below deeply pinnatifid, the segments subovate or dentiform, *fertile* ones bearing the sori on the changed caudate and generally more or less entire usually falcate extremity, the very apex sometimes sterile and pinnatifido-serrate, veins solitary in each lobe soriferous in the fertile portion at their base clubbed at the apex, sori oblong soon confluent.—*Metten. Polypod. p. 32.* Grammitis, *Sw. Syn. Fil. p. 22.* Willd. *Sp. Pl. v. p. 141.* Schk. *Fil. p. 9. t. 7.* Hook. *Ex. Fl. t. 78.* Xiphopteris, *Klfs. Hook. Gard. Ferns, t. 44, and others.* Asplenium, *Sw. Fl. Ind. Occ. p. 1007.* Polypod. myosuroides, *Sw. Fl. Ind. Occ. p. 1644.* *Metten. Polypod. p. 33.* Grammitis, *Sw. Syn. Fil. p. 22.* Xiphopteris, *Klfs. and others.*— $\beta$ . *strictissimum*; very strict deeply pinnatifid almost pinnate below, the frondose portion in age separating from the costa. Xiphopteris Jamesoni, *Hook. 2d Cent. of Ferns, t. 14.*

Hab. Tropical America, apparently universal, Island of Juan Fernandez, *Capt. Wood.* Sandwich Islands, *Menzies, Brackenridge, Hillebrand.* Tropical West Africa, *Curror, Barter.* Mauritius, *Bouton.*— $\beta$ . Quito, *Jameson.*—A very variable species it must be confessed, and I fear my *X. Jamesoni* is one of the states of it.

31. *P. (Eupolypodium) setosum*, Metten.; caudex short creeping scaly, fronds here and there imperfectly setose tufted 1–2 inches high 1 line wide coriaceous rigid scarcely stipitate linear-lanceolate obtuse dentato-pinnatifid for its whole length, upper half soriferous.—*Metten. Polypod. p. 33.* Grammitis, *Pr. Xiphopteris, Klfs. En. Fil. p. 275.* Grammitis myosuroides, *Schk. Fil. p. 9. t. 7.* *Raddi, Fil. Bras. p. 12. t. 22. f. 3, according to his figure; but a specimen from the author in my herbarium is P. serrulatum.*

Hab. Brazil, *Raddi.* Organ Mountains, *Gardner (without number).*—This wants the caudate and nearly entire fertile apex; the teeth or segments of the barren and fertile portion are uniform: perhaps a mere variety of *serrulatum*. At any rate Raddi has considered the two as one, and the figure of Schkuhr, so generally quoted for that supposed species, seems identical with *setosum*.

32. *P.?* (*Eupolypodium*) *binerve*, Hook.; caudex creeping? (a dense mass of tufted fibres only appears on our specimen, concealing the rhizome), stipites scarcely any, fronds nearly sessile very numerous caespitose 3–6 inches long  $\frac{1}{4}$  of an inch wide firm-membranaceous lurid-green linear subflexuose or a little falcate deeply pinnatifid nearly to the rachis, lobes oblong- or rotundato-quadrate, the narrower ones with a single rarely forked vein, the broader ones with *two distant* parallel undivided straight veins clavate at the apex

just within the margin, terminal lobe very large  $\frac{1}{2}$ – $\frac{3}{4}$  of an inch long ovate-oblong very obtuse generally broader than the rest of the frond its veins pinnated, sori? (TAB. CCLXXIII. B.)

Hab. Madagascar, *Dr. Lyall*.—This has too much the habit and texture of a true Fern for me to omit all notice of it in the present work, although it is quite destitute of fructification; and I trust some early researches of botanical travellers in Madagascar, now happily thrown open to Europeans, may make us better acquainted with it. The remarkable features about the plant are the subquadrate form of the lateral lobes, with one or, far more frequently, two distinct and distant veins, with a large terminal lobe having pinnated veins, somewhat resembling the caudate fertile apex in *P. serrulatum*.

33. *P. (Eupolypodium) denticulatum*, Pr.; “fronds shortly stipitate linear-lanceolate deeply pinnatifid glabrous coriaceous, lowermost pinnæ (segments?) dentiform decurrent, intermediate ones ovate acute rarely toothed cucullate monosorous, caudex paleaceous.” *Bl.—Metten. Polypod. p. 39. P. cucullatum, Bl. En. Fil. Jav. p. 129. Grammitis denticulata, Bl. En. Fil. Jav. p. 121. t. 50. f. 4.*

Hab. On trees, among mosses, Java, *Blume*.—I am not acquainted with this species. If correctly described by Blume, who alone seems to have known the plant, I am perhaps wrong in my conjecture expressed under my description of *P. clavifer*, Hook. in Second Century of Ferns, that it might belong to a form of *P. cucullatum*. The figure is very unsatisfactory.

34. *P. (Eupolypodium) cucullatum*, Nees; caudex very small ascending fibroso-radicant, stipites densely caespitose 1–2–3 lines long, fronds membranaceous 1–5 inches long linear-lanceolate acuminate deeply nearly to the costa pinnatifid, segments 1–2 lines long ovato-oblong recurvo-patent obtuse entire, those of the upper half of the frond broader conduplicate fertile, veins solitary in each segment, in the fertile ones bearing a solitary large subrotund or oblong sorus partly concealed by the conduplication of the segment, costa and sometimes the frond deciduously piloso-setose.—*Nees et Bl. Nov. Act. Acad. ii. p. 121. t. 12. f. 3. Metten. Polypod. p. 33. Grammitis, Bl. En. Fil. Jav. p. 119. t. 50. f. 3. J. Sm. in Hook. Journ. Bot. n. 206. Calymmodon, Pr. Moore. Plectopteris gracilis, Fée, Gen. p. 230. t. 19. B.*

Hab. Java, *Blume, Thos. Lobb. Luzon, Cuming, n. 206. Mt. Ophir, Malacca, Griffith. Kina-balau, Borneo, H. Low. Rhamboda, Ceylon, Gardner*.—A species distinguished by the conduplication of the fertile segments, well represented in the figures above quoted.

35. *P. (Eupolypodium) clavifer*, Hook.; caudex rather stout ascending copiously rooting, fronds scarcely stipitate

densely crowded cæspitose 4-5 inches long firm rigid-membranaceous narrow- or linear-lanceolate acuminate pinnate, pinnæ remote patent terminated by 1-3 long setæ, *sterile* ones very narrow linear, *fertile* spatulate acute concave the superior margin reflexed, veins solitary simple in each pinna not reaching to the apex soriferous below its extremity occupying the dilated portion of the pinna, rachis very hispid having a narrow wing on each side connecting the pinnæ (or the whole frond may be considered deeply pinnatifid).—*Grammitis* (*Calymmodon*) *clavifer*, *Hook. 2d Cent. of Ferns*, t. 5.

Hab. Kina-balû, Borneo, *H. Low*.—An extremely interesting plant, evidently of the same group with *P. cucullatum*, but remarkably distinct.

36. *P. (Eupolypodium) subpinnatifidum*, Bl. En.; caudex very small indistinct, stipites tufted 1-3 lines long ferrugineo-pilose with patent hairs, fronds 4-6 inches long 2 lines broad membranaceous linear obtuse attenuated at the base sinuato-pinnatifid with rounded segments lowest ones abbreviated subtriangular and much decurrent, veins one to each segment forked, the superior branch bearing a solitary rounded sorus at the base of the lobe, young sori oblong and apparently sunk in a cavity.—*Metten. Polypod. p. 39. Grammitis, Bl. Fil. Jav. p. 118. t. 49. f. 2. Pol. Haaliloanum, Brack. Fil. U. S. Expl. Exp. p. 6. t. 1. f. 4.*

Hab. Java, *Blume*. Sandwich Islands, on trees, *Brackenridge*.—A well marked species, with no small resemblance to some large *Jungermannia*. Not only do *Brackenridge's* and *Blume's* figures well correspond, but authentic specimens from both authors in my herbarium clearly show the specific identity of the two. This circumstance is scarcely to be regretted, considering the very inharmonious specific name given in compliment to a Hawaiian Chief.

37. *P. (Eupolypodium) Organense*, Metten.; caudex small erect, stipites short a few lines long cæspitose, fronds 6-8 inches long 3-4 lines broad firm subcoriaceous-membranaceous linear-lanceolate glabrous coarsely serrato-pinnatifid acuminate much attenuated and decurrent at the base by the very abbreviated segments or teeth, veins forked one to each lobe or tooth, sori copious oval-oblong one to each lobe situated on the superior branch of the fork large close to and obliquely parallel with the costa approximate, capsules mixed with copious hairs arising from the receptacle.—*Metten. Polypod. p. 39. Grammitis, Gardn. in Hook. Ic. Pl. t. 509.*

Hab. Brazil, rocks and trunks of trees, Organ Mountains, *Gardner, n. 5913*.—A well marked species, with the habit of *P. trichomanoides* and *truncicola*, but

very different in the short teeth-like lobes of the frond, and in the oval or oblong sori, which are large and so approximate as to cover and conceal the whole disk of the frond.

38. *P. (Eupolypodium) trichomanoides*, Sw.; caudex short erect paleaceous above densely rooting with wiry fibres, stipites short  $\frac{1}{2}$ –1 inch long densely tufted patenti-villous with long fulvous hairs, fronds 3–4 inches to a span long 2–4 lines wide rigid-membranaceous linear attenuated at both extremities deeply nearly to the costa pinnatifid or almost pinnate (quite so at the very base), lobes horizontally patent from a broad base ovate or oblong entire subconcave beneath subdeciduously ciliated with long fulvous or blackish patent hairs, veins solitary in each lobe and forked, upper branch bearing a single sorus near the costa.—*Sw. Syn. Fil. p. 184. Willd. Sp. Pl. v. p. 134. Schk. Fil. xi. t. 10. Metten. Polyp. p. 40. P. gibbosum, Fée, 6me Mém. Foug. Nouv. p. 8. t. 2. f. 2, and P. Serricula, Fée, l. c. p. 9. t. 7. f. 1. P. nanum, Fée, Gen. Fil. p. 238 (Metten.). P. sertularioides, J. Sm. in Hook. Journ. Bot. iii. p. 394.—β. jungermannioides*; dwarf, 1–3 inches long glabrous, stipites elongated.

Hab. Tropical America, abundant on the mainland, from Brazil and Guiana to the Pacific, and in the islands. East Indies: Malacca, *Cuming, n. 380*; Lachen, Sikkim-Himalaya, *Hooker, fil.*—β. Island of Ascension, summit of Green Mountain, alt. 2300 feet, *Hooker, fil.*—This is doubtless a very variable Fern in size and texture, and I am not sure that the lobes are always monosorous; nor am I satisfied that the following species, *P. truncicola*, is really distinct from it.

39. *P. (Eupolypodium) truncicola*, Kl.; “fronds cæspitose linear rigid membranaceous sinuato-pinnatifid sparingly and on both sides fuscescens-pilose, the apex short towards the base much attenuated, segments short oblong obtuse entire approximate erecto-patent alternate monosorous, sori large deep-brown approximate to the costa.”—*Kl. in Linnæu, xx. p. 374. Metten. Polyp. p. 40.*

Hab. Trunks of trees, frequent in New Granada and in the Quitinian Andes, *Moritz, n. 333, 252, Jameson, n. 369, 370. Venezuela, Fendler, n. 211, and summit of the Blue Mountains, Jamaica, Purdie (passing into P. trichomanoides). Juan Fernandez, Douglas (scarcely differing from P. trichomanoides).*—Some of the Ecuador specimens are very fine, large, and bear long rich brown-coloured hairs very copiously, not only on the margins of the fronds, but on the superficies still I have numerous samples showing, as it appears to me, a passage from the one species to the other.

40. *P. (Eupolypodium) trichosorum*, Hook.; caudex moderately stout subrepent fulvo-crinite copiously rooting, stipites tufted 2–3 inches long slender filiform villous with long

spreading fulvous hairs, fronds drooping membranaceous subpellucid 3-5 inches long subspathulato-membranaceous yellow-green obtuse entire when young in maturity lobato-pinnatifid, lobes rounded entire, on the upper side sparingly, beneath and at the margins copiously crinite with long patent ferruginous hairs, veins patent flexuose pinnate, veinlets clavate at the apex, sori sub-4-serial small having hairs among the capsules.—*Hook. 2d Cent. of Ferns, tab. 13.*

Hab. On trees, Forest of Archedona, Quitinian Andes, *Jameson, n. 349.*—A well-marked species, having some affinity with *P. setigerum* of Blume, from Java, but abundantly distinct.

41. *P. (Eupolypodium) Andinum*, *Hook.*; caudex short ascending copiously rooting, stipites 2-3 lines long tufted, fronds 4-6 inches long membranaceous bright-green pellucid  $\frac{1}{2}$  an inch wide linear-oblong moderately tapering at each extremity crinite with long patent scattered fulvous hairs pinnatifido-lobate with short rounded lobes, veins forked, sori globose or oval forming two series one on each side nearer the costa than the margin.—*Hook. 2d Cent. of Ferns, t. 6.* *P. crispatum*?, *Willd. Sp. Pl. v. p. 180.* *Plum. Fil. p. 85. t. 102. B?*

Hab. Andes of Quito, near the River Hondache, *Jameson, n. 780*, and Cerro de Alitagua, on trees, *Spruce, n. 5282.* Mount Picóte, near Mayobamba, Peru, *C. W. Nelson (Spruce, n. 4780).*—A very distinct species, as may be seen by the plate above quoted. Plumier's figure, the *P. rispatum*, *Willd.*, has no slight resemblance to this species; but that appears to be much more flaccid and pendulous.

42. *P. (Eupolypodium) decorum*, *Brack.*; caudex short rather thick creeping densely ferrugineo-squamose, stipites approximate subterminal on the caudex 2-4 lines long rather stout, fronds coriaceous glabrous 6-12 inches long  $\frac{1}{2}$ -1 inch broad narrow-lanceolate much and almost caudato-acuminate the base very gradually attenuated into the short stipes deeply and nearly to the rachis pinnatifid, segments horizontally patent narrow-oblong obtuse quite entire, below gradually becoming shorter and broader and forming shallow elongated lobed wings at the base, costa glabrous or pilosulous, costule and veins quite sunk and inconspicuous, sori oblong 5-8-10 in two rows parallel with the costa and between the costa and the margin partially sunk in a hairy cavity (but with no raised border) at length confluent.—*Brack. Fil. U. S. Expl. Exp. p. 7. t. 2. f. 2 (excellent).* *P.*



nutans, *J. Sm. in Hook. Journ. Bot.* iii. p. 394, and *Metten Polyp.* p. 41 (excl. syn. "*Bl. Fil. Jav.* p. 182. t. 86. A."). *P. Serra, Wall. Cat.* 313/2.

Hab. Singapore, *Wallich, in Herb. nostr.* Mount Ophir, *Griffith.* North-west India, *Edgeworth.* Luzon, *Cuming*, n. 398. Borneo, *Wallace.* Tahiti, *Brackenridge.* Gaudalcanau, on trees, Baydo Creek (Fiji ?), *Milne.* Borneo, *Thos. Lobb.*—The specimens I have referred to this species are quite uniform, and are unquestionably one and the same. *Cuming's* plant, n. 398, is referred by *J. Smith* (without any remark) to *P. nutans*, *Bl.*; and *Mettenius* does the same and describes it under that name, but he observes, "Specimina descripta forma laciniarum ab icone laudata *Blumeana* recedunt." *Blume* represents a much larger plant, with a rather long stipes, not winged, with the altered segments at the base. I think it better to preserve *Blume's* species, whatever it may be.

43. *P. (Eupolypodium) nutans*, *Bl.*; "fronds subnutant (they are rather subfalcate) deeply pinnatifid subcoriaceous glabrous punctate beneath, segments alternate linear obtuse entire, lower ones subtriangular, sori solitary intramarginal confluent, stipes and rachis puberulous."—*Bl. Fil. Jav.* p. 182. t. 66. A (*scarcely of Mettenius and J. Smith*).

Hab. Java, *Blume*.—"Soris," he says, "non immersis, nudis, et admodum confluentibus, speciem hanc a *P. venuloso* et *obliquato*, *Bl.*, forsan facillime distinguere licet."

44. *P. (Eupolypodium) blechnoides*, *Hook.*; caudex short stout (for the size of the plant) subrepent ferrugineo-paleaceous, stipites subclustered short  $\frac{1}{2}$ –1 inch or more long, fronds firm-coriaceous glabrous 6–10 inches long 1–1½ wide lanceolate acuminate much tapering at the base by the gradual diminution in length of the lower segments deeply almost quite to the dark-brown rachis pinnatifid, segments obtuse all with a broad and decurrent base, upper and fertile ones linear-oblong, lower ones broader and obliquely subtriangular (inferior margin straight), lowest segments forming narrow lobelike wings to the stipes, costules and veins quite sunk and undistinguishable, sori oblong forming two lines one on each side the costa and margin and nearly parallel with them moderately sunk in a depression (without hairs?).—*Grammitis blechnoides*, *Grev. in Edinb. Ann. and Mag. of Nat. Hist. N. Ser. v. 1. p. 328. t. 17.* *Metten. Polyp.* p. 42. *P. contiguum*, *Brack. Fil. U. S. Expl. Exp.* p. 6. t. 2. f. 1. *Cryptosorus Seemanni*, *J. Sm. in Seem. Plantæ Vitienses*, n. 823.

Hab. Island of Raialea, Friendly Islands, *Dr. Sibbald.* Mountains, Fiji Islands, *Brackenridge, Seemann.* Aneiteum, *Milne.*—*Brackenridge* not inaptly compares this with some states of *Davallia contigua*, *Sw. (Polypod. contiguum, J.*

Sm., not of Brack.), but observes that the fructification is totally different. It has a near affinity with *P. decorum*, but is quite distinct in the above characters.

45. *P. (Eupolypodium) pilosissimum*, Mart. et Gal.; "caudex creeping clothed with lanceolato-subulate rather rigid blackish scales, stipites 1-2 lines long, fronds coriaceous glabrous above, beneath and at the margin and on the stipes setose with patent blackish hairs at length glabrous 4-8 inches long lanceolate acuminate deeply pinnatifid, segments 6-7 lines long 1-1½ line wide contiguous, from a broad base elongato-oblong obtuse or oblong-lanceolate entire, veins immersed ending in an incrassated apex on the upper side having a blackish depression, sori dorsal 3-6 on each side the costule intermediate between the costule and the margin, while young surrounded by long blackish setæ longer than the sorus." *Metten.—Mart. et Gal. Fil. Mex. p. 39. t. 9. f. 2. Metten. Polyp. p. 42.*

Hab. Mexico, *Galeotti*, n. 6379. New Grenada, *Fendler*, n. 219, *Moritz*, n. 216, n. 26, n. 382, *Schlim*, 399. Surucuchó, Ecuador, *Jameson*. Ocaña, elev. 8000 feet, *Seemann*, n. 954. Organ Mountains, Brazil, *Gardner*, n. 111.—This is probably a common tropical American species. It is tolerably well represented by *Martens* and *Galeotti*. The specimen is unusually large, and the hairs on the stipes are too long and too lax. In age the hairs sometimes almost wholly disappear.

46. *P. (Eupolypodium) mollicomum*, Nees; "fronds linear-lanceolate deeply pinnatifid coriaceous and as well as the stipes fusco-villous, segments alternate oblong obtuse entire, lower ones subtriangular, sori solitary submarginal confluent." *Bl.—Nees and Bl. Act. Acad. Nat. Cur. xi. p. 121. t. 12. f. 2. Bl. Fil. Jav. p. 184. t. 86. B. Metten. Polyp. p. 41.*

Hab. On high mountains, Java, *Blume*.—Of this I have no authentic specimens. A solitary frond from *Blume*, in Mr. J. Smith's herbarium, very much resembles *P. fuscatum*, *Bl.*, as does *Blume's* figure above quoted.

47. *P. (Eupolypodium) fuscatum*, *Bl.*; "fronds lanceolate deeply pinnatifid submembranaceous pilosulous, segments alternate linear rather obtuse entire, lower ones narrower, sori solitary submarginal confluent, stipes and rachis villous." —*Bl. Fil. Jav. p. 185. t. 86. C. Metten. Polyp. p. 41.*

Hab. On trees in mountain-woods of Java, *Blume*. "Scarcely different from the preceding (*P. mollicomum*), which it exceeds in size, its fronds are of a thinner texture, segments narrower and longer, lower ones smaller and remote, generally narrow-spathulate." *Blume*.—My specimens of *P. fuscatum*, from *Miquel* and *De Vriese*, do not seem to verify the observations of *Blume*. But it requires a more extensive suite of specimens, than has come under my notice, of both, to judge how far the two are really different, and what are their specific distinctions.

48. *P. (Eupolypodium) moniliforme*, Lagasc.; caudex long creeping or short and ascending densely rooting clothed with lanceolato-subulate blackish scales, stipites scattered and distant or aggregated towards the apex of the caudex from  $\frac{1}{2}$ –2–3 inches long deciduously hairy, fronds quite glabrous 4–6 and 10 inches long  $2\frac{1}{2}$ – $3\frac{1}{2}$  lines wide very coriaceous thick dark-brown or black above when dry, attenuated at both extremities deeply almost to the costa pinnatifid with acute sinuses, segments semiorbicular oval or oblong the margins more or less revolute entire or subsinuate, costule and veins sunk quite concealed, sori about four globose at length confluent.—*α. Andinum*; fronds small, segments semiorbicular. *P. moniliforme*, Sw. *Syn. Fil. p.* 33. *Willd. Sp. Pl. v, p.* 184. *Metten. Polyp. p.* 41. *P. subcrenatum*, Hook.  *Ic. Pl. t.* 719. *Metten. Polypod. p.* 42. *P. melanostichum*?, Kze. in *Linnaea*, ix. *p.* 44. *Jamesonia adnata*, Kze. in *Schk. Fil. Suppl. p.* 80. *t.* 133. *f.* 1.—*β. rigescens*; usually larger, segments oval-oblong or even oblong-acuminate. *P. rigescens*, Bory, in *Willd. Sp. Pl. v. p.* 183. *Hook. et Grev. Ic. Fil. t.* 216.

Hab. *α.* Mountain regions of tropical America: Brazil, New Granada, Ecuador, and Peru (at elevations even of 10,000 feet, *Spruce*), Guatemala, Mexico (9000–12,000 feet, *Galeotti*). West Indies: Jamaica, *Purdie*; Cuba, *Wright*, n. 811 (in part) and 1050.—*β.* Bourbon, Bory, in *Herb. nostr.* West tropical Africa: Fernando Po, on the Peak, alt. 4000 feet, *G. Mann*, n. 361. Brazil, summit of Organ Mountains, *Gardner*, n. 5915 and 5916. Ocaña, *Schlim*, n. 365. Peru, *Mathews*, n. 977. Tarapota, *Spruce*, n. 4642. Ecuador, Quito, *Jameson*, n. 75. Tunguragua, *Spruce*, n. 5279, *A*, with the caudex 2 feet long, thicker than a swan's quill, extended on the earth among Ericaceous plants, not rooting, densely clothed with imbricated scales; and, from the same locality, *Spruce*, n. 5279, *B*, are specimens with short, thick, branched caudices, squarrose with crisped scales, and fronds a foot long, with segments an inch long, from a broad base, linear-oblong and subacuminated, often glaucous beneath.—The very acute Mr. Spruce remarks, "I think all the specimens marked 5279 belong to the same species." I can quite believe it, and that there is a gradual passage from the small *P. moniliforme*, with its comparatively minute semiorbicular segments, to the large narrow acuminate ones just mentioned; and from the small short caudex, scarcely forming a rhizome, to the stout caudex of 2 feet in length.

49. *P. (Eupolypodium) ferrugineum*. Mart. et Gal.; "caudex?, stipites 1 inch long hirsute with ferruginous hairs, fronds membranaceous rather rigid 5–6 inches long hairy at the costa beneath, the rest glabrous lanceolate acuminate pinnatifid to the rachis, segments 5 lines long 1 line wide the broader base adnate and decurrent contiguous lanceolate or linear gradually attenuated acute entire lower ones re-

mote distinct dwarfed narrower, veins manifest soriferous on the back, sori 5-9 on each side at the costule." *Metten.*—*Mart. et Gal. Fil. Mex. p. 36. t. 7. f. 2* (a very small specimen with the frond only  $2\frac{1}{2}$  inches long). *Metten. Polypod. p. 43.* *P. xiphopteroides?*, *Lieb. Fil. Mex. p. 44.*

Hab. Mexico, "*Galeotti, n. 6380 bis.*" Tovar, Columbia, *Moritz, Mettenius, in Herb. nostr.*—My authentic specimens of Mettenius (from Tovar) I should have been disposed to refer to the *P. apiculatum*, Kl., or, what I believe is the same thing, a small var. of *P. Plumula*. It resembles a good deal Fée's figure of the following species, but does not accord well with the description. The two are from the same country.

50. *P. (Eupolypodium) leptostomum*, Fée; "fronds narrow, stipes short brown clothed with capitate hairs (viscose?), rachis of the same colour but clothed with acute hairs, segments linear-lanceolate glabrous acute rigid erect, lateral veinlets simple short, capsules lax 5-7 central, sporangia rounded, ring of twelve joints, prominent at the opening, spores ovoid, caudex erect woody bearing very long brown radicles."—*Fée, 7me Mém. Foug. Nouv. p. 58. t. 21. f. 2.*

Hab. Mexico, on trees, Orizaba, *Schaffner.*

51. *P. (Eupolypodium) subscabrum*, Kl.; "fronds 3-6 inches long pinnatifid broad-linear membranaceous stipitate adpressedly scabrous viscidulous, segments 3-5 lines long lanceolato-linear subobtuse horizontal alternate distant multisorous, veins pinnately branched branches short soriferous, sori small dirty-brown uniserial opposite, stipes and rachis filiform brown at length glabrous." *Kl. in Linnaea, xx. p. 377. Metten. p. 43. (TAB. CCLXXIV. A.)*

Hab. Colombia, Merida; *Moritz, n. 332.* Ecuador, on trees, Valley of Lloa, *Jameson.* Bay of Utria, *Seemann.* New Granada, Sierra Nevada, alt. 10,000 feet, *Schlim, n. 843.*—Among other difficulties attending the study of the Ferns, is that arising from not finding the descriptions of authors tally with their own specimens. In the present case of the plant which is authority for the species, I possess an original from Klotzsch as 332 of Moritz, and the same is quoted by Mettenius; but my specimens are not scabrous, nor have they linear (Metten.) or linear-lanceolate (Kl.) segments, but rather oval-oblong; and certainly none of my specimens approaches  $1-1\frac{1}{2}$  foot in length, with segments  $1\frac{1}{2}$  inch long, according to Mettenius, as may be seen by our figure. The species is remarkable for the long purplish hairs on the stipes, and still longer on the margins of the segments.

52. *P. (Eupolypodium) Jamesonoides*, Fée; "surculus slender erect, stipes short filiform, fronds linear multipartite fasciculate viscid nearly glabrous with the evolution at the apex indefinite, segments diminishing in size from the base

to the apex obtuse opaque, capsules 6-8 thick confluent covering the entire surface, capsules subrotund, its pedicel broad the annulus of fourteen articulations, spores polymorphous."—Fée, 6me Mém. Foug. Nouv. p. 59. t. 21. f. 4.

Hab. New Grenada, Ocaña, Schlim, n. 399.—"A weak, pendulous, narrow Fern, with the indefinite evolution of *Jamesonia*," the apex of apparently a perfect frond, being circinate, but having few striking characters. Fée compares it to *P. subscabrum*, Kl. (our preceding species), but it accords neither with Klotzsch's description nor his authentic specimen in our herbarium.

53. *P. (Eupolypodium) parvulum*, Bory; "caudex creeping clothed with ferruginous narrow-lanceolate scales, stipites 3-4 lines long margined, fronds rigidly membranaceous glabrous 3-4 inches long lanceolate deeply almost to the costa pinnatifid, segments 3-4 lines long  $1\frac{1}{2}$  line wide at the inferior base coadunate and continuous oblong or ovate-oblong rather obtuse rarely oblong-lanceolate entire, lower ones abbreviated and long-decurrent, veins evident incrassated below the apex rarely soriferous on the middle of the back, sori 3-6 on each side." Metten. (TAB. CCLXXIV. B.)—Bory, in Willd. Sp. Pl. v. p. 182. Bl. Fil. Jav. p. 87. t. 187. C (according to Blume and Mettenius). Metten. Polyp. p. 43. *P. inconspicuum*, Bl. Fil. Jav. p. 130.

Hab. Bourbon, Bory. Mauritius, Sieber, Syn. 52 (Metten.), Carmichael, in Herb. nostr., Dr. Ayres (segments broader). Java, Blume, Millett, Thos. Lobb.—I possess no authenticated specimen of this; but my specimen from Mauritius, gathered by the late Capt. Carmichael, quite accords with Mettenius's description, better than with Blume's figure. My Java specimens from Lobb and Millett also seem to be the true plant.

54. *P. (Eupolypodium) delicatulum*, Mart. et Gal.; caudex short creeping clothed with subulate blackish scales, stipites somewhat clustered  $1-1\frac{1}{2}$  inch long patenti-pilose, "fronds rather rigid on both sides and at the margin ferrugineo-setose  $4\frac{1}{2}$  (to 6) inches long linear (subattenuate at both extremities) pinnatifid to the very costa, segments  $2\frac{1}{2}-3$  lines long  $\frac{3}{4}$  line wide contiguous from a rather broad base oblong obtuse exterior lower ones distinct, veins immersed bearing a sorus at the apex, sori subimmersed with ferruginous hairs in their circumference 4-5 on each side the costule intermediate between the costule and the margin." Metten.—Mart. et Galeotti, Fil. Mex. p. 35. t. 7. f. 1 (very faithful). Metten. Polyp. p. 44.

Hab. Mexico, on Oaks of the Sierra Yavergia, elev. 7000 feet, Galeotti (in Herb. nostr.), Schaffner. Tunguragua, Ecuador, on mossy stones, Spruce, n.

5372, larger, more coriaceous, rather less villous.—The figure above quoted well represents our Mexican specimens; those of Mr. Spruce are slightly different.

55. *P. (Eupolypodium) apiculatum*, Kze.; “caudex creeping clothed all over with lanceolate-acuminate shortly setose dirty-brown appressed scales, stipites 2–3 lines long shortly pubescenti-hirsute, fronds subcoriaceous glabrous 5–7 inches long elongato-oblong acuminate deeply pinnatifid to the costa, segments 7–9 lines long 1–1½ line broad, inferior ones distinct, superior contiguous from a broader base sub-attenuated at the inferior side rather obtuse entire, veins sub-immersed 5–8 on each side all soriferous and incrassated at the apex, on the upper side terminating in a minute depression longer than the infra-apical sorus, sori slightly sunk.” *Metten.*—Kze. in *Linnaea*, xx. p. 378. *Metten. Polyp.* p. 44. *P. Pecten*, Fée, *Gen.* p. 240 (*Metten.*).

Hab. Venezuela, *Linden*, n. 239 (*Metten.*). Columbia, *Tovar*, *Moritz*, n. 247 (*Herb. nostr.*, from *Mettenius*). Venezuela, *Berschel*, *Fendler*, n. 217 (*P. leptophyllum*, *Moritz*, *mst.*, *Eaton*) and n. 218. Brazil, *Gardner* (*Mettenius*), Organ Mountains, n. 110, in *Herb. nostr.* Ecuador, Chimborazo, alt. 3000 feet, *Spruce*, n. 5713.—The specimens from Venezuela, according to Mr. *Eaton* named *P. leptophyllum*, *Moritz*, *mst.*, seem identical with the plant I have received from *Mettenius* as the true *P. apiculatum*; and all from the above localities I should have little hesitation in considering forms of *P. Plumula*, Willd.

56. *P. (Eupolypodium) firmum*, Kl.; “caudex creeping clothed with lanceolate-acuminate entire dirty-brown glabrous scales, fronds deeply pinnatifid oblong long-acuminate attenuated at the base and long stipitate, segments lanceolate rather obtuse straight erect (?) multisorous black-green glabrous, sori small deep-brown, stipes dirty-brown, and the rachis piloso-hispid.”—Kl. in *Linnaea*, xx. p. 378. *Metten. Polyp.* p. 44.

Hab. British Guiana, *Richard Schomburgk*, n. 1170, in *Herb. nostr.*, from *Klotzsch*. Andes of Chili, *Philippi* (*Klotzsch*). Merida, Columbia, *Funck* and *Schlim*, n. 1103 (in part, *Mett.*). I have the same from Xalapa, *Harris*, and from St. Domingo, *R. Schomburgk*.—Caudex as thick as a goose-quill. Stipes slender, 1–3 inches long. Frond 4–6 inches long, 6–14 lines wide. Segments 3–7 lines long, 1–1½ line wide.—I give above the entire description of the author of this species, whose original specimens are in my herbarium; but my materials are hardly sufficient to enable me to form an opinion upon it.

57. *P. (Eupolypodium) monticola*, Kl.; “caudex filiform elongated, stipites 2–3 lines long setose, fronds 2 inches long sparingly setose linear, almost to the base pinnatifid, segments contiguous 2–2½ lines long 1 line wide ovate or ovato-oblong obtuse entire, lower ones abbreviated much decur-

rent, veins subimmersed abbreviated at the base of the superior half or on both sides the costule mono-di-sorous, sori with a few setæ in the circumference." *Metten.*—*Kl. in Linnæa*, xx. p. 377. *Metten. Polyp.* p. 45.

Hab. Merida, *Moritz*, n. 383, "Fortasse status juvenilis speciei sequentis" (*P. Peruvianum*). Andes of Peru, *Herb. Ruiz*, n. 58 (*Klotzsch*).—I give Mettenius's character rather than that of the original describer, Dr. Klotzsch, to whom, nevertheless, I am indebted for the only specimen I possess, for it seems to be the most accurate. If there be any real distinction between this and *P. Peruvianum*, which Mettenius very properly doubts, it must be sought in the slender, filiform, creeping, scaleless caudex, a foot long in my specimen, with small fronds not 2 inches long and 2-3 inches apart, whereas Klotzsch describes the fronds as cæspitose.

58. *P. (Eupolypodium) Peruvianum*, Desv.; caudex creeping setaceous with blackish subulate scales or often (perhaps in first year's plants) small and inconspicuous, apparently a mass of matted fibres, stipites  $\frac{1}{2}$ -3 inches and even more long scattered and distant on the creeping caudex, tufted in the absence of distinct caudex patently villous, fronds 3-5 inches long  $\frac{1}{3}$  of an inch wide coriaceous firm linear-lanceolate acuminate and quite caudate at the apex gradually tapering at the base deeply to the rachis pinnatifid, segments subtriangular-ovate obtuse with the lower margin decurrent and a few scattered hairs on the margin and on the costule entire or rarely sinuated, veins immersed inconspicuous, sori rather large 2-4 on each segment with a few hairs among the capsules.—*Desv. Mém. Soc. Linn.* vi. p. 321. *Hook. et Grev. Ic. Fil.* t. 223. *Metten. Polyp.* p. 45. *P. stipitatum*, *Hook. et Grev. in Hook. Bot. Misc.* ii. p. 239. *P. anfractuosum*, *Kze. in Kl. Linnæa*, xx. p. 375. *Metten. Polyp.* p. 45.

Hab. Peru (*Desvaux*), Hualhuy, near Pasco, *Mathews*, n. 978, *Cruckshanks*. Merida, *Moritz*, n. 330 (*Klotzsch, in Herb. Hook., P. anfractuosum, Kl.*).—The figure in *Ic. Fil.* well represents the caudate form of this plant, but the stipites are longer than in any of our other specimens. Most of those from New Granada have shorter stipites and no really visible caudex.

59. *P. (Eupolypodium) jubæforme*, Klff.; "caudex cæspitose clothed with ovato-lanceolate scales, stipes 2-4 lines long, fronds membranaceous and deep-green or coriaceous and pale beneath very glabrous 4-10 inches long linear pinnatifid to the base, segments  $2\frac{1}{2}$  lines long  $1-1\frac{1}{2}$  line wide contiguous by the inferior decurrent base obliquely ovato-oblong a little produced at the base above obtuse very entire, lowest ones abbreviated much decurrent, veins manifest or

immersed, lower ones sterile, superior and abbreviated ones soriferous, sori 2-5 on each side the costule very protuberant on the upper surface of the frond intermediate between the costule and the margin." *Metten.*—*Klf. Fl.* 1823. p. 364. *Metten. Polypod.* p. 45, who also quotes *P. suspensum*, *Sieb. Fl. Mart. n.* 353, not *n.* 242 (which is true *suspensum*), *Syn. Fil. n.* 182, and *P. saccatum*, *Fée, 6me Mém. p.* 10. t. 7. f. 3). —*P. aliud pendulum minimum*, *Plum. Fil. p.* 68. t. 87. B.

Hab. Tropical America: Antilles, *Sieber*; British Guiana, Surinam, and Porto Rico (*Metten., in Herb. nostr.*), St. Vincent, *Lansdown Guilding*; Straits of Juan de Fuca, *Seemann*.—This Fern is figured by *Fée* and described by *Mettenius*, but the latter offers no observations on its affinities. *Fée's* figure is very good, and he justly observes that "Cette espèce se rapproche du *Calymmodon* par ses sporothèques à demi cachés par le repli de la marge des lobules, et du *Ctenopteris* par des sporothèques en apparence enfoncés dans la lame; quoiqu'ils soient supracuticulaires."

60. *P. (Eupolypodium) flabelliforme*, Lam.; "caudex caespitose clothed with ovato-lanceolate scales, stipes 3-4 lines long, fronds membranaceous flaccid glabrous 4-7 inches long linear pinnatifid to the costa (almost pinnated), segments 2 lines long broader at the base decurrent below subcontiguous produced at the upper side irregularly crenated fertile, veins manifest abbreviated, one or two on the upper half soriferous." *Metten.*—*Lam. Encycl. v. p.* 519. excl. *Syn. Plum. (according to Mettenius)*. *Sw. Syn. Fil. p.* 33? *Willd. Sp. Pl. v. p.* 184. *Kze. in Linnæa, ix. p.* 43. *Metten. Polyp. p.* 46. *P. Tovarense*, *Kl. in Linnæa, xx. p.* 375. *P. sessile*, *Fée, 7me Mém. vii. p.* 60. t. 25.—*β, minus*; pinnæ twice or thrice smaller, costal vein unbranched monosorous.

Hab. Peru, *Pæppig*. Columbia, *Moritz, n.* 460 (*Herb. nostr., from Mettenius*). Venezuela, *Fendler, n.* 207, 208, and 209 (*P. sessile, Fée and Eaton*). Quitinian Andes, *Jameson, n.* 405 and 790. Ocaña, *Schlim, n.* 390 and 637.—*β*. Ecuador, on trees, Cerro de Abitagua, *Spruce, n.* 5271, and Tunguragua, on stones, *n.* 5272 (on this latter *Spruce* remarks, "a *n.* 5271 differt pinnis minoribus supra squama una alterave instructis;" but I fail to see this scale in the dried state of the plant).—*Kunze* correctly observes of this, "fronde vere lineari, laciniis brevissimis subflabellatis, soro solitario, differt a *P. jubæiformi*, Klf., cæterum simillimo." The frond is truly pinnated, and the superior base also is free and parallel with the rachis, hence the pinnæ (rather than the segment/s) take a flabellate form.

61. *P. (Eupolypodium) subtile*, Kze.; "caudex caespitose, fronds 2-3 lines long membranaceous soft-setose on every side shortly stipitate linear-lanceolate pinnatifid to the costa, segments  $1\frac{1}{2}$ -2 lines long 1 line wide slightly decurrent at the inferior base contiguous short oblong or produced above ovate obtuse entire, veins manifest abbreviated here and



there (as well as the costule) on the upper side at the incrassated apex having a calcareous scale beneath soriferous, sori near the costule with hairs at the circumference." *Metten.* (TAB. CCLXXV. A.)—*Kze. Kl. in Linnæa*, xx. p. 375. *Metten. Polyp.* p. 46 (*excl.* *P. leucosticton*, *Fée, Gen.* p. 240).

Hab. Merida, "*Moritz*, n. 325." Venezuela, *Fendler*, n. 349. Peru, *Mathews*, n. 1812. Andes of Ecuador, *Jameson*, n. 405.—One of the most beautiful and delicate of all this group.

62. *P. (Eupolypodium) leucosticton*, *Fée*; "fronds pendulous linear pilose, hairs reddish, stipes filiform cylindrical brown, segments obtuse oblong pilose, hairs scattered long reddish, lateral veinlets simple short turgid at the apex pellucid, costule flexuose blackish evanescent, sori about six roundish below having a calcareous white dot ("sporothecis inferne puncto calcareo albo determinantibus"), capsules ovoid, ring thick unequal with 14-15 joints, spores roundish unequal." *Fée, Gen. Fil.* p. 240 (*not Kze.*). *7me Mém. Foug. Nouv.* p. 58. t. 21. f. 3.

Hab. "Cuba, *Jameson*."—I am unacquainted with this Fern. Kunze refers it to *P. subtile*, while Mettenius considers it quite distinct. I fear there is some error in considering it a native of Cuba, or in Professor Jameson being the discoverer or sender of it. I never knew him to send any plants from Cuba, or from any country but Ecuador.

63. *P. (Eupolypodium) minutum*, *Bl.*; "fronds shortly stipitate linear-lanceolate deeply pinnatifid and as well as the stipes pubescent, segments ovate-oblong obtuse short repand 1-3-sorous, lower ones dentiform, sori confluent." *Bl. Fil. Jav.* p. 188. t. 87. *D* (*not Metten. Polypod. as far as regards Cuming's n. 205 from Luzon, the only locality he gives, and which is P. subfalcatum*).

Hab. Summit of Mount Gedé, Java, on the trunks of trees, *Blume*.—"An elegant Fern,  $1\frac{1}{4}$  to nearly 4 inches long. Fronds erect, 1-3 inches long, 2-3 lines wide, membranaceous, villous." This, whatever it may be, is very different from Mettenius's Luzon specimen (*Cuming*), to which he refers it. Perhaps too nearly allied to *P. parvulum*, *Bl.*

64. *P. (Eupolypodium) discolor*, *Hook.*; caudex very small short and erect clothed with firm lanceolate subulate scales, fronds tufted sessile 4-6 inches long  $\frac{1}{2}$ - $\frac{3}{4}$  of an inch wide lanceolate obtuse tapering at the base glabrous deeply to within 1 line of the rachis pinnatifid naked above or minutely dotted with white beneath clothed white-pulverulent substance all over, segments patent oblong-ovate obtuse the

margins entire a little reflexed, costule and veins quite immersed not apparent, sori 7-9 in two rows near the margin, rachis slightly prominent beneath less so on the upper side. —*Hook. Ic. Pl. t. 4. Metten. Polyp. p. 47.*

Hab. British Guiana, *Schomburgk*, n. 1031.—A most distinct and apparently rare species, for I have never seen any specimens save those collected by Schomburgk. In a young state, the white pulveraceous substance probably covers the upper as well as the under surface, and in age disappears.

65. P. (Eupolypodium) *Kegelianum*, Kze.; "frond small lanceolate rather obtuse attenuate at the base decurrent subcoriaceous opaque veinless, on each side especially beneath and at the thickish subreflexed margin fusco-pilose pinatifid, segments triangulari-ovate obtuse entire with patent sinuses, sori about five near the margin, stipes very short and as well as the caespitose caudex ferrugineo-setoso-paleaceous." *Kze. in Linnæa*, xxi. p. 210. *Metten. Polyp. p. 47.*

Hab. Surinam, *Kegel*.—"Frons copious, hygrometric, recurved, 2 inches long, 2-4 lines wide, pale-green, somewhat pellucid."—"P. *discolor*, *Hook. Ic. n. 386*, is nearly allied to this, but abundantly differs in being twice larger, the fronds sessile, more linear than lanceolate, obtuse, powdery, white beneath, glabrous above, opaque, the laciniae are longer, narrower, the sinuses acute, and the sori 7-8 in each segment. No other known to us approaches it." *Kze.*

66. P. (Eupolypodium) *lanigerum*, Eat., an Desv.?; "caudex caespitose, stipes 4 lines to 1 inch long cano-villose, fronds 3-8 inches long all over subvillose with whitish hairs which are at length rufidulous lanceolate attenuated at both extremities here and there lengthening by innovations pinatifid to the costa, segments distinct subcontiguous larger ones in the middle 6-8 lines long 1-1½ line wide from an equal base or above a little produced elongato-oblong obtuse entire, lower ones abruptly decreasing oblong or ovate obtuse, the lowest ones abbreviated rotundato-ovate distant, veins scarcely manifest, sori 8-12 on each side the costule intermediate between the costule and the margin, capsules here and there with a single seta." *Metten.—Eat. Fil. Wright. et Fendl. p. 108. Desv. Journ. Bot. vi. p. 263? Kze. in Linnæa*, ix. p. 43? *Metten. Polyp. p. 49? P. laxum, Pr. Reliq. Hænk. i. p. 23. t. 4. f. 1 (fide Kze. and Metten.)*

Hab. Peru, *Hænke, Poeppig?* Venezuela, *Fendler*, n. 212.—My specimens of *P. lanigerum* of Kunze, collected by Poeppig, and from Klotzsch, and from Jurgensen (Mexico), I am disposed to consider small states of *P. cultratum*. Fendler's plant seems quite different from these, and has, I believe, been authenticated by Mettenius, whose character I give above; and it is of a more rigid texture,

the segments often free and more than 1 inch long, the stipes and rachis are rigid. It has some affinity with *P. suspensum*.

67. *P. (Eupolypodium) cultratum*, Willd. ; caudex inconspicuous roots of tufted fibres, stipites aggregated a few lines long shaggy with long slender fuscous hairs, fronds villous with spreading similar hairs 3-14 inches long  $\frac{1}{2}$ -1 inch wide linear- or oblong-lanceolate membranaceous brownish-green flaccid pinnated, pinnæ ovate-oblong horizontal obtuse the superior base a little produced the inferior slightly decurrent entire uppermost rarely coadunate, lowest ones moderately abbreviated, costule rather remote simple, veins apparent, sori one or two on each segment near the apex or two on each side between the costule and the margin, capsules setose.—*Willd. Sp. Pl. v. p. 187. Metten. Polyp. p. 47. P. suspensum, Lechl. p. 7 (not Linn.). Plum. Fil. t. 88. P. xanthotrichum, Kl. in Linnæa, xx. p. 376. Metten. Polyp. p. 48. P. ellipticosorum, Fée, Gen. p. 239. P. reclinatum, Brack. Fil. U. S. Expl. Exp. p. 11 (certe).—Var.  $\beta$ , minus ; *P. elasticum*, Bory, in *Willd. Sp. Pl. v. p. 183. Metten. Polyp. p. 47. P. cultratum, Sieb. Fl. Mixt. n. 291, and Syn. Fil. n. 54. P. flexile, Fée, 6me Mém. p. 9. t. 2. f. 3 (very good, and taken from Sieber's specimens).**

Hab. Tropical America : Martinique, etc., Venezuela, Moritz, n. 250, Schlim, n. 960, Fendler, n. 210 ; Andes of Ecuador, Spruce, n. 5278 ; Brazil, Gardner, n. 112 ; Fernando Po, alt. 3000 feet, G. Mann.—Var.  $\beta$ . Mauritius and Bourbon, Bory, Carmichael, Sieber, Bojer. Peru, Poeppig. Amazon, Casiquari, etc., Spruce, n. 1720 and 3449. Venezuela, Fendler, n. 348. Jamaica, Wilson. Cuba, C. Wright, n. 1018.—A good species, but it is impossible to separate from it the small form which has gone by the name of *P. elasticum*. It is best perhaps distinguished from its allies by the much pinnated, very fuscous-villous fronds, and the peculiar shape of the pinnæ. The upper base is rounded off and hence a little free and separate from the rachis, while the lower base is decurrent, so that the pinnæ are unequally sided. The South American specimens from the above localities are identical with those from Mauritius and Bourbon. My authentic ones of *P. xanthotrichum*, Kl. (*P. ellipticosorum*, Fée, according to Mettenius), prove that it is the same as *P. cultratum*.

68. *P. (Eupolypodium) obliquatum*, Bl. ; caudex short creeping rather stout ferrugineo-paleaceous, stipites approximate 2-3 lines to  $1\frac{1}{2}$  inch long glabrous, fronds firm-membranaceous scarcely subcoriaceous 6-12-14 inches long  $1\frac{1}{2}$ -2 inches broad lanceolate acuminate and subcaudate tapering below deeply pectinato-pinnatifid nearly to the base, segments approximate from a broad base lineari-acuminate often acute entire, lower ones gradually shorter, the lowest triangular much abbreviated, costule and simple oblique veins

evident, sori several in two rows one on each side the costa oblique sunk in an oval cavity (which is protuberant on the upper side) and is surrounded by an elevated border.—*Bl. Fil. Jav. p.* 181. *t.* 58. *B* (very good). *Metten. Polyp. p.* 49. *Cryptosorus Blumei, Fée, Gen. p.* 231. *Ctenopteris rufescens, Kze. Bot. Zeit. iv. p.* 425 (*Metten.*). *An P. repandulum?*, *Metten. Polyp. p.* 50.

Hab. Java, *Blume, Thos. Lobb, De Vriese and Teijsmann, n.* 7. Penang, *Sir William Norris. Luzon, Cuming, n.* 111. Ceylon, *Gardner, n.* 1147, 1284, 1290, 1146. Madras Peninsula, *Wright, n.* 3447.—A well marked species; possibly *Mettenius's P. repandulum* from Ceylon ("*Gardner, n.* 59"). The numbers received by *Mettenius* of *Gardner's* Ferns are invariably different from mine. The present is the only species of the *Cryptosorus* group I have from Ceylon.

69. *P. (Eupolypodium) Celebicum, Bl.*; "fronds nutant (subfalcate) long stipitate (3–5 inches) lanceolate deeply pinatifid coriaceous, segments horizontal alternate linear obtuse ciliated veinless beneath, lower ones abbreviated subtriangular, sori solitary marginal immersed pubescent."—*Bl. Fil. Jav. p.* 179. *t.* 84. *B.*

Hab. On trees in woody mountains of Celebes Klobat, *Reinwardt, in Blume. Borneo, H. Low.*—This is the largest and most coriaceous of the *Cryptosorus*-group, readily recognized by its villous stipites and rachis, and immersed and consequently (externally) indistinct venation. My specimens from Borneo well correspond with *Blume's* description and figure, particularly the latter. Sori numerous on each segment or pinna (for this species is rather pinnate than pinatifid), distinct (not confluent), 12–16 on each side the costule.

70. *P. (Eupolypodium) Khasyanum, Hook.*; caudex short creeping scaly, stipites short tufted (articulated upon the caudex as appear to be all of this group), fronds a span to 14 inches long 1–1½ inch broad subcoriaceous-membranaceous hairy below and on the costa deeply nearly to the rachis pinatifid with very acute sinuses, segments approximate horizontally patent from a broad and subdecurrent base oblong obtuse or the lower ones subtriangular or short and rounded entire or subsinuate ciliated, costule flexuose, and simple oblique veins apparent, sori short-oval eight or ten on each segment in two rows nearer the margin than the costa sunk into an oval cavity (having an elevation on the opposite or upper side) bordered by a raised margin.—*Hook. Ic. Plant. t.* 949 (or *Century of Ferns, t.* 49). *Metten. Polyp. p.* 50.

Hab. On trees, Khasya, alt. 4000 feet, *Hook. fil. et Thomson. Assam, Jenkins.*—Very distinct from any other of the *Cryptosorus*-group in the somewhat flaccid and hairy nature of the frond, with broad segments extending almost to the caudex.

71. *P. (Eupolypodium) tenuifolium*, H. B.; caudex repent short thickish in age and clothed with beautifully crisped ferruginous scales, stipites remote 1-4 inches long rather stout erect, fronds 8-12 inches long 2 inches broad firm-membranaceous glabrous or very slightly pubescent on the rachis and costules beneath broad-lanceolate acuminate scarcely at all attenuated at the base pinnated (rather than pinnatifid), pinnæ horizontally patent distant  $\frac{1}{2}$  an inch apart 1-1 $\frac{1}{2}$  inch long 1 line wide linear obtuse moderately decurrent (hence a little broader at the base) quite entire or obtusely sinuato-dentate, costule slender sinuate, veins erecto-patent simple or forked, sori slightly sunk in a cavity 6-10 on each side the costule and occupying the space between it and the margin.—*Humb. and Bonpl. Nov. Gen. i. p. 9. Willd. Sp. Pl. v. p. 185. Metten. Polyp. p. 51. P. camptoneuron, Fée, Gen. Fil. p. 237. 7me Mém. Foug. Nouv. p. 60. t. 23. P. tenuius et nodosum, Plum. Fil. p. 66. t. 85.*

Hab. St. Domingo, *Plumer*. New Granada, *Humboldt and Bonpland, Jurgensen*, n. 664. Cuba, *Linden*, n. 1886, *C. Wright*, n. 809.—Probably a rare species, well figured, however, by Fée, under the name of *camptoneuron*. The fronds, as well as the stipites, are quite erect and firm, but not at all coriaceous.

72. *P. (Eupolypodium) pteropus*, Hook.; caudex a small scaly rhizome densely rooting with copious fibres suberect, stipites terminal cæspitose very short 2-4 lines often none (in other words the stipes is winged with dwarfed lobes or segments to its very base slightly hairy), fronds firm-membranaceous or even subcoriaceous erect 4-18 inches long 1-3 or more inches wide glabrous more or less opaque or subpellucid lanceolate acuminate singularly contracted and decurrent below deeply almost quite to the base pinnatifid rarely subpinnate, segments remote linear and often elongato-linear obtuse or subacuminate entire (not lobed or sinuated) their base broad and much decurrent when within a few inches of the stipes suddenly dwarfed much dilated above and below and forming shallow lobelike wings reaching to the caudex, rachis and costule black, veins short oblique numerous each bearing a small slightly sunk oval or subrotund sorus rather nearer the costule than the margin. (TAB. CCLXXV. B.)

Hab. Mossy trunks of trees, Andes of Quito, alt. 3000-6000 feet, *Jameson*, n. 348, *Spruce*, n. 5712, and in Mount Abitagua, *Spruce*. Roraima, Venezuela, *Schomburgk*. New Granada, *Hartweg*, n. 1495.—I do not find this to be noticed by any author; its nearest affinity is perhaps with *P. decipiens*, but it has an

erect mode of growth; the lowest segments form so many decurrent shallow lobes or wings upon the otherwise elongated stipes, giving a peculiar aspect to the plant, and the pinnae are quite entire.

73. *P. (Eupolypodium) subfalcatum*, Bl.; caudex small obliquely erect crinite rather than paleaceous, stipites short 3-8 lines long patenti-pilose, fronds firm-membranaceous hairy on both sides and on the costa 6-8 inches long 1-1½ inch broad oblong-lanceolate subacuminate attenuated below deeply almost to the rachis pinnatifid, segments horizontally patent from a rather broad and decurrent base linear-lanceolate acute strongly serrated or pinnatifido-serrate, lower ones remote distinct smaller than the rest, costule slender flexuose, veins evident distant oblique soriferous at the apex, sori small globose one to each serrature equidistant between the costule and the margin.—*Bl. Fil. Jav. p. 186. t. 87. A. B. J. Sm. in Hook. Journ. Bot. iii. p. 394. Metten. Polyp. p. 52. P. filipendulifolium, Fée, Gen. Fil. p. 240. 6me Mém. p. 11. t. 5. f. 3.*—*β, glabrum*; fronds glabrous.

Hab. Java, *Blume, Zollinger, Thos. Lobb, De Vriese and Teijsmann, n. 79. Luzon, Cuming, n. 205. Nepal, Wallich. Kumaon, alt. 8500 feet, Strachey and Winterbottom. Sikkim-Himalaya, Hook. fil. et Thomson.*—It is singular that Mettenius should refer the well-marked specimens of this plant of Cuming, n. 205, to the *P. minutum* of Blume.

74. *P. (Eupolypodium) solidum*, Metten.; “caudex creeping clothed with reddish lanceolate acuminate scales, stipes 8 lines to 1 inch long, fronds coriaceous firm very glabrous above opaque green pale beneath 4-8 inches long linear attenuated at each extremity acuminate pinnatifid nearly to the rachis, segments 2-4 lines long ¼-1¼ line wide contiguous adnate at the nearly equal base oblong obtuse serrato-dentate, lowest ones abbreviated, veins immersed forked or several times forked extending into the teeth attenuated at the apex on the back of the anterior branch soriferous, trabeculae formed of elongated incrassated brown cells appear at the apex of the ultimate veins in the teeth, sori oblong subimmersed 1-4 on each side the costule intermediate between the costule and the margin.”—*Metten. Polypod. p. 53. t. 1. f. 1-3.*

Hab. Java, “*Zollinger, n. 165.*”—Unknown to me. There is no striking peculiarity in the form, etc., of the frond, except, indeed, the dark lines forming the trabeculae, which are very remarkable. Kunze seems to have considered it a *Ctenopteris*.

75. *P. (Eupolypodium) glandulosum*, Hook.; caudex small  
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indistinct clinging to the bark of trees by copious rooting fibres, the rest of the plant all over piloso-glandulose most so beneath, stipites tufted 1-3 lines long, fronds 2-4 inches long  $\frac{1}{4}$  inch broad linear obtuse scarcely attenuated at either extremity rather firm-membranaceous subsucculent deeply nearly to the rachis pinnatifid, segments ovate subacute horizontally patent decurrent at the base, lowermost ones free all of them serrato-pinnatifid, costule and rather distant few and oblique simple veins indistinct, sori few globose. (TAB. CCLXXVI. A.)

Hab. On trees, Ceylon, *Gardner*, n. 1289, *Thwaites*.—A small species, perhaps most nearly allied to *P. subfalcatum*, but readily distinguished by the copious glandular hairs, especially clothing the under side of the frond, giving almost a furfuraceous appearance to that part of it.

76. *P. (Eupolypodium) comptoniaefolium*, Desv.; caudex thick creeping densely fusco-paleaceous above, stipites sparse 4-5 inches long black patenti-villous often bent at an angle, fronds 5 inches to a span long sparingly villous an inch and more wide firm-membranaceous pinnatifid about  $\frac{1}{3}$  of the way down to the slender costa, lobes patent obtuse, veins flexuose, veinlets forked bearing the sori beneath the apex irregularly scattered on the surface, sori often oval partially sunk.—*Desv. Berl. Mag.* v. p. 316. *P. comptonioides*, *Desv. Mém. Linn. Soc.* vi. p. 231. *P. trifurcatum*, *Linn. Sp. Pl.* p. 1543. *Willd. Sp. Pl.* v. p. 165. *Klf. En. Fil.* p. 96. *Metten. Polypod.* p. 54. *P. scolopendrioides*, *Hook. et Grev. Ic. Fil.* p. 42. *Plum. Fil. t.* 138 (*abnormal form, trifid at the apex*).

Hab. West Indies: Martinique, *Plumier*; Guadeloupe, *L'Herminier*; Porto Rico, *Schwanecke*.—On trees, Ecuador, Forest of Archedona, and at Abitagua, *Jameson, Spruce*, n. 5280.—It seems a pity to preserve the name of *trifurcatum*, although of Linnean origin, for it is derived from a monstrous form of the frond, analogous to that which occurs at the apex of *Scolopendrium vulgare* in Europe.

77. *P. (Eupolypodium) pendulum*, Sw.; caudex small erect paleaceous with ferruginous scales, stipites aggregated 2-3 lines long more or less downy (often winged to the very base), fronds coriaceous-membranaceous 4-5 inches to 1-1 $\frac{1}{2}$  foot long 1-2 inches broad glabrous oblong-lanceolate acuminate long-attenuated at the base deeply nearly to the rachis pinnatifid, segments very patent  $\frac{1}{2}$  an inch to 1 $\frac{1}{4}$  long 1-3 lines wide from a broad base more or less decurrent below oblong often gradually acuminate but obtuse, inferior ones gradually dwarfed and forming a sinuated or lobed wing nearly to the base of the rachis, veins evident simple or

forked, sori slightly impressed forming two lines between the costule and the margin, rachis often black.—*Sw. Syn. Fil.* p. 33. 131. *Schk. Fil.* p. 12. t. 10. *Willd. Sp. Pl.* v. p. 182. *Metten. Polyp.* p. 55.

Hab. On trees in the mountains, West Indies: Jamaica, *Swartz, Dr. Wright* (1½ foot and more long), *Wilson*; Guadeloupe, *Sieb. Syn. Fil.* n. 52 (small), *L'Hermier*. British Guiana, *Richard Schomburgk* (varying from 4–12 inches). Venezuela, *Fendler*, n. 350. Brazil, Aracas, on trees, *Gardner*, n. 5914. Peru, on the Andes, *Mathews*, n. 1102 (segments 1½ inch long, finely acuminate).—Schkuhr's figure (the only one that I know of) represents a very small specimen of this species, which is best distinguished by the gradual dwarfing of the lower segments; these are so decurrent as to form a narrow lobed wing to the whole stipes.

78. *P. (Eupolypodium) Adenophorus*, Hook. et Arn.; caudex small ascending clothed with narrow-acuminate scales fibroso-radicant below, stipites tufted less than an inch long clavato-glandulose, fronds pendent a span to a foot long an inch broad subcoriaceo-membranaceous elastic elongato-lanceolate moderately acuminate tapering at the base deeply nearly to the rachis pinnatifid glanduloso-ciliate the rest glabrous, segments from a broad decurrent base subtriangulari-oblong horizontal subfalcate acute entire or sinuato-dentate, veinlets simple or forked, sori few in the upper half of the segments intermediate between the costule and the margin.—*Hook. and Arn. Bot. of Beech. Voy.* p. 104. t. 22. *Brack. Fil. U. S. Expl. Exp.* p. 8. *Metten. Polypod.* p. 55. *P. pendulum*, *Gaudich. in Freyc. Voy.* p. 349 (not *Sw.*), and *Adenophorus pinnatifidus*, *l. c.* p. 365.

Hab. Sandwich Islands, *Gaudichaud*, *Beechey*, *Brackenridge*. Peru, *Mathews*, n. 1808.—*Mettenius* gives Guadeloupe (and only Guadeloupe), *Funch and Schlim*, n. 217, as the native country of this Fern, which I only know from the Sandwich Islands and from Peru, *Mathews*.—Perhaps too nearly allied to *P. pendulum*.

79. *P. (Eupolypodium) sarmentosum*, Brack.; caudex very small scaly rooting below and sometimes sarmentose (Brack.), stipites solitary or sparingly tufted scarcely an inch long, fronds subcoriaceo-membranaceous subglanduloso-pubescent 3–6 inches long 1–2 inches wide lanceolate or oblong-lanceolate caudately acuminate attenuately decurrent at the base deeply nearly to the costa pinnatifid, segments subhorizontally patent 1–1½ line wide rather obtuse entire or repando-dentate unequal in length, veins simple, sori globose rather irregular scarcely forming a continued line or series, capsules mixed



with articulated clavate hairs.—*Brack. Fil. U. S. Expl. Exp. p. 8. t. 2. f. 3 (excellent).*

Hab. Sandwich Islands, on rocks and decayed wood, frequent, *Menzies, in Herb. nostr., Brackenridge*, who justly observes that it is allied to *P. Adenophorus*, "but distinct and well marked as a species."—It is perhaps still more closely allied to some forms of the New Zealand *P. graminifolius*, Br., but it wants the pinnatifid segments of that species and the more or less elongated sori. Dr. Hillebrand sends me good specimens and a small and narrow variety, which he had named *P. Haalilioanum*, Brack. (*P. subpinnatifidum*, Bl., and of this work).

80. *P. (Eupolypodium) suspensum*, L.; caudex creeping paleaceous with dark-brown subulato-setaceous scales, stipes sparse 4–8–9 inches long stout villous with patent ferruginous hairs often very densely so erect below, curved above and generally geniculated at or near the apex so as to place the frond in a drooping direction, frond subcoriaceous firm green long-ciliated at the margin glabrous or long-villous on both surfaces a span to 2 feet long 1–3 inches broad lanceolate or oblong-lanceolate elongated acuminate scarcely attenuated at the base deeply nearly to the costa pinnatifid, segments 1–3–4 lines broad from a broader and decurrent base oblong acute rather than acuminate entire, lowest ones a little abbreviated, veins manifest simple or forked, superior and shorter branch soriferous but varying in length so that the series of sori are sometimes nearest the costule sometimes to the margin pseudodorsal.—*Linn. Sp. Pl. p. 1544. Sw. Syn. Fil. p. 32. Willd. Sp. Pl. v. p. 181. Metten. Polyp. p. 56. P. arcuatum, Moritz, in Herb. nostr. Metten. Polyp. p. 56. P. laxifrons, Liebm. Fil. Mex. p. 52. P. pendulum et glabrum, Plum. Fil. p. 67. t. 87 (very bad, if really intended for this Fern).*

Hab. Tropical America, abundant. West Indies, *Plumier, Sieber, n. 242*; yet Mettenius refers this to *P. asplenifolium*. Martinique, Jamaica, *Wilson, n. 744 and 584, and others*. St. Vincent, Cuba, *C. Wright, n. 810*. Columbia, frequent, *Moritz, n. 334, n. 264 b (P. arcuatum, Moritz)*, and without n. (named *P. Funckii, Raddi, Fil. Brazil, t. 27, f. 2, by Mettenius*), *Funck and Schlim, n. 589, 855, 962, Fendler, n. 213, 215, and 216 (P. radicale, Moritz, fide Metten.)*, 467, *Linden, n. 186. Mexico, Liebm. Guatemala, Skinner. Brazil, Rio, Gardner, n. 128 and 129. Ecuador, Andes of Quito, alt. 8000 feet, Jameson and Spruce, n. 5711 (ordinary forms).—I think the most characteristic mark of this species is the stout, elongated, wiry stipes, erect, but towards the apex suddenly bent or geniculated, so that the direction of the frond is downwards, taken in conjunction with the somewhat coriaceous, firm frond, obtuse, not sensibly attenuated at the base. The veins I find to be usually forked, the superior and shorter branch bearing the sori at its apex. My specimen of *P. Schkuhrri* from Mettenius (Tovar, *Moritz*) is assuredly *P. suspensum*, and does not accord either with Schkuhr's figure of *pectinatum* or Raddi's *P. Schkuhrri*.*

81. *P. (Eupolypodium) asplenifolium*, L. ; "caudex creeping clothed with ferruginous densely setose scales, stipes 3-4 inches long, fronds villous with patent ferruginous hairs on all sides (at length glabrous) 1-1½ foot long membranaceous flaccid linear nearly to the costa pinnatipartite, segments all contiguous 6-8 lines long 4 lines wide obliquely ovate or ovato-oblong obtuse the inferior margin subexcised the superior obtusely auricled entire, the lowest ones a little abbreviated, veins manifest forked, sori (pseudodorsal or rather lateral on the veins, according to Mettenius's figure) nearer the costule than the margin, capsules with four or more setæ." *Metten.* (the same setæ are attributed to the capsules of *P. suspensum* by Mettenius).—*Linn. Sp. Pl. p. 1554. Sw. Syn. Fil. p. 32. Willd. Sp. Pl. v. p. 180. Metten. Polyp. p. 56. t. 1. f. 116? (venation only). P. suspensum, Sieb. Fl. Martin. n. 242. Asplenium altius et villosum, Plum. Fil. p. 85. t. 102. A (a very unsatisfactory figure).*

Hab. On trees, Martinique, *Plumier, Sieber.* West Indies (*Mettenius*), Jamaica, *Wilson, n. 6.*—Great confusion prevails in regard to the two Ferns described in books as *P. suspensum* and *P. asplenifolium*. This group of *Eupolypodium* is rendered difficult enough by nature's variations, but is greatly increased when the exaggerated figures of Plumier are taken as the authority for the species; inasmuch as many of them bear little similarity to any known kinds. I have mentioned what I believe to be the distinguishing feature of *P. suspensum*, but that plant is quite at variance with Plumier's figure. I give Mettenius's description of *P. asplenifolium*, because it is the most carefully drawn up, and he is likely to be familiar with the plant of the German botanists.

82. *P. (Eupolypodium) villosissimum*, Hook.; caudex short thick horizontal or ascending clothed with rather long linear subulate pale-brown membranaceous scales, stipites aggregated 3-4 inches long often obtusely geniculate patentivillous with long ferruginous hairs, fronds subcoriaceous dark-green when dry 3-7 inches long 1-1¾ inch wide lanceolate scarcely acuminate deeply nearly to the rachis pinnatifid long ciliated villose above densely so beneath with long dark ferruginous hairs, segments patent ½ an inch to 1 inch long from a broad decurrent base oblong and obtuse or ovate and oblong and acute, veinlets obscure internal approximate twice or more forked extending to the margin or nearly so, sori subglobose dorsal in two rows nearer the costa than the margin.

Hab. West Coast of Africa: Sugar-loaf Mountains, Sierra Leone, *Barter* (1857); Island of St. Thomas, alt. 6000 feet, *Gustav Mann*, and Fernando Po (hairs equally long, but less copious, and segments linear-oblong and obtuse).—But for the quite shaggy appearance of the normal form of this plant, and for the

very different venation, I should have been disposed to refer this to a state of *P. suspensum*, which it much resembles in habit.

83. *P. (Eupolypodium) papillosum*, Bl.; caudex creeping paleaceous with brown subulate scales, stipites 6 inches to a span high sparse erect rather stout and as well as the rachis glabrous brown glossy, fronds a span to a foot and more long 2 inches wide membranaceous subpellucid dark-green elongato-oblong moderately acuminate abrupt or scarcely attenuated at the base deeply almost quite to the base pectinately pinnatifid glabrous, segments linear-oblong obtuse exactly horizontal obscurely serrated only at the apex, veins manifest distant erecto-patent forked, branches spreading, superior one bearing the sorus nearer the margin than the costule sunk in a very deep cavity or sack forming a very elevated papilla on the upper side.—*Bl. Fil. Jav. p. 191. t. 88. Br. in Horsf. Pl. Jav. Rar. p. 6. t. 2. Hook. Ic. Pl. t. 946 (or Century of Ferns, t. 46). Metten. Polyp. p. 56.*

Hab. Java, *Blume, Thos. Lobb.* Philippine Islands, *Cuming, n. 185.*

84. *P. (Eupolypodium) argyratum*, Bory; "caudex creeping paleaceous with reddish flaccid scales, stipes 3 inches long, fronds subcoriaceous together with the stipes sparingly above beneath more copiously sprinkled with a white cereaceous substance 4 (-5) inches long elongato-oblong acuminate pinnatifid nearly to the costa, segments 6 lines long 2½ lines wide from a coadunate equally dilated base oblong-lanceolate gradually attenuated acute entire, lowest ones abbreviated, veins sunk forked, the inferior ones here and there confluent, sori near the margin 4-6 on each side the costule." *Metten.—Bory, in Willd. Sp. Pl. v. p. 175. Metten. Polyp. p. 57. P. argyrophanes, Spr. Syst. Veg. iv. p. 51.*

Hab. Bourbon, *Bory, Carmichael.*—My only specimens of this apparently rare plant, from Captain Carmichael, have the same white, subpulverulent, cereaceous covering, so conspicuous in my *P. farinosum*.

85. *P. (Eupolypodium) leucosorum*, Boj.; caudex thick short creeping clothed with setaceo-paleaceous scales, stipites 4-6 inches long brown glossy slender, fronds a span to a foot long 1½-2 inches wide coriaceous (pendulous?) elongato-oblong acuminate cuneate at the base, of the same colour on both sides (destitute of white cereaceous matter) deeply pinnatifid to within 1-2 lines of the base, segments from a broad base decurrent below oblong gradually acuminate or acute entire, veins sunken generally twice forked,

basal superior branch soriferous, sori intermediate between the costule and the margin, young ones only quite white apparently with a cereaceous substance.—*Bojer, Hort. Mauriti. (name only) p. 417. Hook. Ic. Pl. t. 942, and t. 943 (more mature specimen, with shorter segments, and with oval sori).*

Hab. Bourbon, *Carmichael, and in Herb. Hook. from Herb. Mus. Par. Mauritius, Prof. Bojer.*—This may possibly be a state of *P. argenteum* of Bory, and comes from the same country; but the white covering is here entirely confined to the young not fully developed sori.

86. *P. (Eupolypodium) Funckii*, Metten.; “caudex elongate creeping, stipes stramineous shining 3–4 inches long sparsely clothed with ovali-obtuse appressed scales, fronds membranaceous very glabrous 6–7 inches long lanceolate or elongato-oblong acuminate pinnatifid to the costa, segments contiguous 1–2 lines long 2 lines wide from a broad adnate base (sursum adscendente) linear gradually attenuated subfalcate acute entire, lowest ones deflexed here and there abbreviated, veins manifest forked or the lowest ones bifurcate here and there forming areoles of *Marginaria*, sori in the middle between the costa and the margin 6–9 on each side the costule.” *Metten. Polyp. p. 57.*

Hab. “Brazil, *Funck et Schlim, 963 and 964.*”—Unknown to me.

87. *P. (Eupolypodium) flicula*, Klf.; “fronds deeply pinnatifid, segments linear very narrow repand alternate distichous, stipes rachis costa and margin hirsute, sori minute solitary.” *Kaulf. En. Fil. App. p. 275. Metten. Polyp. p. 58.*

Hab. “Brazil.”—The above is a very imperfect description of probably some well known Fern. Mettenius has given a more enlarged character, if it be the same species; but since, according to Mettenius, it is the *Polyp. Plumula, minor*, of Willd. Herb., may it not be really a form of that species?

88. *P. (Eupolypodium) pulchrum*, Mart. and Gal.; caudex stout scaly creeping partially paleaceous with subulate scales, stipites subaggregated stout black and glossy as well as the rachis and costules glabrous, fronds subcoriaceous 1–1½ foot long 1½–2 inches wide almost black when dry lanceolate more or less acuminate deeply almost to the rachis pectinato-pinnatifid, segments quite horizontal very close linear or only very slightly tapering from a rather broad base a little decurrent below, costules prominent beneath, veins sunk very obscure simple (?), sori small intermediate between the margin and the costule, rachis beneath with scattered brown ovate

much acuminate scales sometimes subpeltate.—*Mart. and Gal. Fil. Mex. p. 41. t. 8. f. 2* (a much reduced and very imperfect figure). *Metten. Polyp. p. 58.* *P. pectinatum, L. (in part).* *Eat. Fil. Wright et Fendl. p. 198.*

Hab. Mexico, Xalapa, elev. 4000 feet, *Galeotti, in Herb. nostr.* Cuba, *C. Wright, n. 806* (in part). New Granada, La Paila, *Holton.* Brazil, prov. Pará, *Spruce, n. 400.*—Clearly allied to our *P. Plumula*; a coarser plant, with obsolete venation, a black, prominent, straight costule beneath, a very opaque frond, almost black, and many scales scattered on the back of the rachis; and thus probably distinct.

89. *P. (Eupolypodium) melanopus, Grev. and Hook.;* stipes black (as is the rachis below) wiry curved glabrous in my only specimens, fronds drooping 7–8 inches long 2–3 inches broad (in the broadest part) obovato-oblong caudately acuminate obtuse (not attenuated at the base) deeply nearly to the rachis pinnatifid into numerous very patent linear acute or obtuse entire closely placed segments sparsely ciliated with very long dark-coloured spreading hairs, costules prominent beneath and the erecto-patent forked veinlets black, sori numerous terminal globose on the superior branch of the fork between the costule and the margin.—*Grev. and Hook. in Hook. Bot. Misc. iii. p. 384. t. 111.*

Hab. Hanging vertically at Surucucho, near Cuenca, Ecuador, from the trunks of trees, elev. 9000 feet above the level of the sea, *Jameson.*—A very distinct and beautiful species, which I have only once received from my valued correspondent Dr. Jameson. The long narrow segments are very close, but rather unequal in length.

90. *P. (Eupolypodium) blandum, Fée;* “stipes short curved with rather long rufous hairs, fronds deeply pinnatifid ovoid triangular, segments quite free below very glabrous opaque cartilaginous undulated veinless (*enerviis*) curved, sori almost marginal remote, sporangia ovoid, annulus with 12–14 articulations, spores subtrigonus, sporangiastrac racemose unilateral.” *Fée, 7me Mém. Foug. Nouv. p. 59. t. 22. f. 5.*

Hab. South America, region unknown (*Fée*).—“Les sporangiasires ont une disposition que nous n'avons vue nulle part ailleurs; ils sont unilatéraux, en grappe, et résultent évidemment de la transformation des anneaux de la sporange.”

91. *P. (Eupolypodium) Plumula, H. B. K.;* caudex creeping or ascending clothed with subulate paleaceous scales, stipes firm rigid 2–4 inches long clothed with copious soft patent hairs, fronds 4 inches to a foot long 1–2 $\frac{3}{4}$  inches wide subcoriaceo-membranaceous opaque or subpellucid lanceolate moderately acuminate more or less attenuated below deeply

and regularly pectinately pinnatifid nearly to the very rachis, segments very numerous and close horizontal linear obtuse scarcely dilated or decurrent at the base, costa black generally pilose, costules very slender and very generally black waved, veins also often black approximate patent simple, sori terminal on the veins in a very regular series near the margin or between the costule and the margin.—*H. B. K. in Willd. Sp. Pl. v. p. 178. Raddi, Fil. Bras. p. 18. t. 27. f. 1. Metten. Polypod. p. 58?* *P. taxifolium, Linn.?* *Sw. Syn. Fil. p. 35? Plum. Fil. p. 69. t. 29.? and t. 83?*

Hab. Tropical America; almost universal on the mainland and in the islands. I may mention the following as published specimens:—Berbice, *Schomburgk* (2 feet long), *n. 328*. Brazil: Pará, *Spruce, n. 1* (downy beneath); Tarapota, *n. 4135* (3 inches long); Peru, *Mathews, n. 3283*; Andes of Ecuador, *Spruce, n. 5283, 5634, and 5636* (segments broader); Venezuela, *Funck and Schlim, n. 957*.—Specimens which I take to be the *P. Plumula* I can best recognize from others of the *pectinatum*-group by the quite simple and frequently black veins, and of which Raddi's figure, as regards general outline, is sufficiently satisfactory. Mettenius described the veins as forked and even repeatedly forked. If the simple vein be no character, then the plant must surely be only a form of *pectinatum*. Some of my specimens, too, from North-west Mexico (*Seemann, n. 1936*), have a remarkable degree of curvature, showing a near approach to our next species, *P. curvatum*, *Sw.*; but the margins of the segments here are entire.

92. *P. (Eupolypodium) curvatum, Sw.*; caudex rather stout creeping paleaceous and rufo-tomentose, stipites approximate 3–4 inches long dark-brown subglabrous and nitent, fronds 6–12–16 inches long 2–3½ inches broad oblong-lanceolate firm coriaceous-membranaceous almost black when dry, singularly curved and flexuose almost circinate curved obtuse or attenuated below, deeply almost to the rachis pectinately pinnatifid (subpinnate towards the base) with close-placed narrow-linear nearly horizontal segments a little dilated and decurrent at the base, the apex acute, the margin sinuato-sublobate or subpinnatifid, sori copious one to each lobule rather bright-yellow oval parallel with the costule and occupying the whole space between the costule and the margin, costule subflexuose, veinlets obsolete probably simple (forked, *Metten.*), rachis pubescent.—*Sw. Syn. Fil. p. 34. Fl. Ind. Occ. iii. p. 1639. Willd. Sp. Pl. v. p. 177. Metten. Polypod. p. 59, and in Lechl. Fil. Peruv. p. 7.*

Hab. Jamaica, *Swartz* (probably rare, as I have never seen it from any of the West Indian Islands). Ecuador, mountains near Cuenca, elev. 12,000 feet, on rocks, *Jameson*. Agapata, Peru, *Lechler, n. 2006*. New Granada, Ocaña, elev. 8000 feet, *Schlim, n. 398*.—A very peculiar-looking species and, I believe, quite distinct, in the singularly curved and flexuose and almost circinate fronds, of a dark, almost brown-black colour when dry, quite studded, as it were, with bright

yellow, oval, very close-placed, yet not confluent, sori. Possibly Swartz's plant may be different from ours.

93. *P. (Eupolypodium) griseum*, Liebm.; "caudex horizontal creeping thick as a swan's quill paleaceous with rigid castaneous acute scales a line long, stipes and rachis stout, frond herbaceous entirely canescently pilosulous 1-2½ feet long 2-3 (or 4) inches wide, segments at the apex and base diminishing in size horizontal parallel remote alternate or subopposite linear-lanceolate 1-2 inches long 2-4 (and more) lines wide rather obtuse obsoletely repand dilated at the base decurrent above and below, costa a little prominent on both sides, veins immersed branched, sori yellowish intermediate between the margin and the costa." *Liebm. Fil. Mex. p. 46.*

Hab. Mexico, Dep. of Puebla, *Liebm.*, in *Herb. Hook.* Guatemala, *Skinner*.—Accurately described by Liebm. My specimens are very uniform. The veinlets are twice or thrice forked, but only the lower superior branch bears a small, yellowish, narrow-oval sorus at its apex.

94. *P. (Eupolypodium) Moritzianum*, Lk.; "caudex creeping, stipes ebeneous above scaberulous with short dense hairs, fronds 1 foot long rigidly membranaceous opaque green somewhat hairy on both sides lanceolate deeply pinnatifid, segments 1-1½ inch long linear gradually narrowing obtuse entire broadly adnate at the base, lower ones with the superior base produced, upper ones with the base equally dilated, veins generally repetito-furcate, sori on each side the costa of the laciniae in a single series near the margin." *Metten.—Link. Sp. p. 126. Metten. in Fil. Hort. Lips. p. 41. Eat. in Wright et Fendl. Fil. p. 198.*

Hab. Venezuela, Tovar, *Moritz*, n. 217 (from *Mettenius*), *C. Wright*, n. 214. —*Mettenius*, in his *Polypod.*, refers this Fern to *P. Paridisæ* (*P. pectinatum, nobis*); but, attached to an original specimen, for which I am indebted to him, he makes the remark, and I think correctly, "injusto inter synonyma *P. Paridisæ* enumeratum." It is, however, one of many species of Ferns that are more readily distinguished by the eye than in words.

95. *P. (Eupolypodium) subserratum*, Hook.; caudex short rather stout creeping, stipes 5 inches long erect stout dull black muricato-hispid, rachis black minutely muricato-papillose below, frond erect 8 inches long nearly 2 inches broad oblong rather sharply acuminate truncate at the base firm-membranaceous dark-green above, paler beneath, regularly and deeply pinnatifid to within a line of the rachis with rather close-placed horizontal oblong very obtuse segments denticulate

only at the extremity, costule straight black not prominent, veins also black and very conspicuous on the under side of the frond close-placed oblong all extending to the margin once forked below the middle, branches close parallel, sori?

Hab. Borneo, *Mr. Wallace*.—This very distinct-looking *Polypodium* is, I regret, only known to me by a solitary specimen, and that destitute of fructification. There can, however, I think, be no doubt of the genus.

96. *P. (Eupolypodium) lomariæforme*, Kze.; “caudex (creeping?) paleaceous, stipes squamuloso-pubescent, frond oblong-linear pinnate pinnatifid at the apex coriaceous rigid, pinnae and segments from an unequally dilated base linear obtuse falcate above, upwards revolute (superne sursum revolutis) inflexed at the margin on the upper side sparingly beneath, and the rachis on both sides squamoso-hirsute, sori in one series large submarginal at length confluent.”—*Kze. in Linnaea*, ix. p. 42. *Metten. Polypod.* p. 59.

Hab. Cassapi, Peru, *Pavpigg, Lechler*.—Very near, according to Kunze, *P. molle*, H. B. K. (which Mettenius refers, the specimen of Herb. H. B. K., to *P. Otites*, L., and of the Nov. Gen. Am. and Willd.), and to *P. Paradisæ*, F. and M., and says, “Ab hoc differt, præter notas indicatas, fronde magis pinnata quam pinnatifida, pinnis remotioribus, margine non repandis; ab illo, nobis non viso, frondis rigiditate, pinnarum directione et soris confluentibus distinctum videtur.” Mettenius gives a rather more extended character, and observes, “nervi immersi repetito-furcati, hinc inde more *Marginariæ* anastomosantes;” but, unfortunately, he makes no allusion to its affinities. I possess authentic specimens both from Kunze and from Mettenius; but, I confess, without their high authority, I should have thought they might have been safely united with *P. Paradisæ*. The more rigid habit, the closely approximate and copious yellow sori, almost covering the under side of the frond, seem to be the chief characteristics. Identical, as it appears, with them I have specimens from Ecuador, *Seemann*, n. 958 (fronds glandulo-pubescent beneath), and from Baños, *Spruce*, n. 5667. The caudex is stout, as thick as a finger, horizontal, subulato-paleaceous, and tomentose.

97. *P. (Eupolypodium) pectinatum*, L.; caudex stout paleaceous, stipites approximate 1–5 inches long, fronds decurved 1–1½ foot long 2–4 inches broad subcoriaceous-membranaceous broad-lanceolate or ensiform acuminate more or less attenuated at the base pectinato-pinnatifid nearly to the rachis often pinnate below blackish-green when dry, more or less pubescent especially beneath, segments very numerous horizontally patent from a broad adnate base often much dilated upwards gradually but obtusely acuminate entire or subsinuate strongly costate, veins rather remote obscure once or twice forked rarely anastomosing so as to form large costular areoles, the lowest superior branch of a fork soriferous, sori globose or suboval forming a continuous series on each



side the costule more or less distant from the margin, rachis and costules hairy especially beneath.—*Linn. Sp. Pl.* p. 1545. *Sw. Syn. Fil.* p. 32. *Willd. Sp. Pl.* v. p. 180 (*excl. syn. Schk.*). *Metten. Polypod.* p. 59. *Griseb. Carib. Pl.* p. 135. *Hook. Gard. Ferns*, t. 10. *Plum. Fil.* t. 80. *Goniophlebium*, *J. Sm. Lond. Journ. of Bot.* iv. p. 57. *P. Paradiseæ*, *Langsd. et Fisch.* p. 11. t. 11. *Willd. Sp. Pl.* v. p. 179. *Metten. Polypod.* p. 60 (*Mettenius refers to this P. ptilodon, Kze., P. molle, H. B. K. Nov. Gen. Am.* i. p. 8, *P. recurvatum* (*larger, pinnated below, pinnæ remote*), *Kaulf. En. Fil.* p. 106, *and P. mœnurum, Link.*). *P. Otites*, *Linn. Sp. Pl.* p. 1545. *Sw. Syn. Fil.* p. 34. *Willd. Sp. Pl.* p. 177. *Kze. in Linnea*, ix. p. 42.

Hab. Tropical America, universal. I have given many localities in the 'Garden Ferns,' above quoted, under *P. pectinatum*, and I have now, after a more attentive study of this pectinated group, if it may be so called, joined to it—and I may say, with little or no hesitation—*P. Paradiseæ*, so admirably figured by Langsdorff and Fischer, *P. Otites*, L., *P. recurvatum*, Kaulf. (*P. mœnurum*, Lk.), and I think I might very safely have added *P. lomariæforme*, Kze. (see n. 96). I shall now briefly notice specimens in my herbarium, which have been distributed with numbers or authentic names, as authority for what I refer to *P. pectinatum*, L. Brazil, *Gardner*, n. 123, 124, 126, 127, 5287, *Sellow* (*P. reclinatum*, *P. amœnum*, Lk.), *Spruce*, n. 2220. B. Guiana, *Rich. Schomburgk* (*P. Paradiseæ*, L. and F.), n. 1136. New Granada, *Schlim*, n. 612, 636, 136, 633, 128, *Fendler*, n. 220 (*P. consimile, Metten. mst. fide Eaton*), n. 221 (*P. Paradiseæ, Eat.*), *Holton*, n. 36 (same as *P. reclinatum, Kaulf.*), *Moritz*, n. 255 (*"P. Otites," Metten.*), and n. 32 (*"P. lomariæforme," Mett.*), *Linden*, n. 185, 529. Panama, *Sutton Hayes*, n. 172, *Fendler*, n. 419, *Cuming*, n. 1210, 1211. West Indies, *Sieber*, n. 334 (*"P. Otites"*), *Murch*, n. 33, *Wilson* (with oval sori), *C. Wright*, n. 806 (*"P. Plumula," Eat.*), n. 1017 (var. with segments irregularly pinnatifidly pectinated, *Peppig* (*"P. Otites," Kze.*)). Mexico, *Linden*, n. 9, 1504, *Galeotti*, n. 6333. Ecuador, *Spruce*, n. 5638 (segments 5–6 inches long, much acuminate, coarsely serrated), n. 5284, 5268. Peru, *Spruce*, n. 4145, 4146 (much attenuated at the base of the frond, and segments very obtuse or retuse), *Mathews*, n. 1104. —If it can be shown that *P. Plumula* (our n. 91) has the veins sometimes once or twice forked, I do not see why that should not be added to the list of synonyms of *P. pectinatum*, L.

98. *P. (Eupolypodium) Schkuhræi*, Rad.; "caudex creeping, fronds deeply pinnatifid truncate at the base, segments linear obtuse approximate horizontal parallel slightly repand clothed on both sides with scattered rarely piliform scales, sori solitary, rachis flexuose, and the stipes hairy."—*Raddi, Fil. Bras. p.* 19. t. 27. f. 2. *P. pectinatum, Schk. Fil.* p. 189. t. 17. b (*excl. syn.*).

Hab. Jamaica and Bourbon (?), according to *Schkuhr*. Brazil, *Raddi*.—A Fern with much of the general structure of *P. Plumula*, but quite truncated at the base; that is, the segments are not gradually reduced in size towards the base. It is quite unknown to me.

99. P.<sup>?</sup> (*Eupolypodium*) *Struthionis*, L.; "fronds deeply pinnatifid truncated at the base, segments linear obtuse repand approximate horizontal parallel." *Willd.*—*Linn. Sp. Pl. p. 1545. Sw. Syn. Fil. p. 35. Willd. Sp. Pl. v. p. 176. Metten. Polypod. p. 60. Plum. Fil. p. 64. t. 82.*

Hab. Saint Domingo, *Plumier*.—This remarkable-looking Fern is only known by Plumier's figure and description. The former exhibits a large creeping caudex, bearing two fronds and the scars of many fallen ones; stipes about 2 inches long, jointed at the base; fronds 10–12 inches long, 4–5 inches wide; in shape it is half of an oblong cut off, as it were, transversely at the base, pinnatifidly divided to within  $\frac{1}{2}$  of an inch of the rachis, in a pectinated manner, into an immense number of narrow-linear, very close-placed, horizontal, parallel, undulato-crispate, obtuse segments, about a line wide. The author describes the margin of the segments, "bordé d'un petit cordon noirâtre tirant tant soit peu sur le roux, et qui leur donne un port tout à fait agréable." This is probably merely a coloured and thickened crenated border; but it seems to have led Willdenow to believe that the plant had some relation to *Pteris*.

100. P. (*Eupolypodium*) *vulgare*, L.; caudex long stout creeping densely ferrugineo-squamosa with crisped scales, stipes 2–4–5 inches long stramineous, fronds 6–12 inches long by 3–4 or nearly 5 wide coriaceous-membranaceous ovate or oblong subcaudato-acuminate deeply pinnatifid nearly to the base, sinuses acute above broad and obtuse below, segments horizontal or nearly oblong or linear-oblong obtuse or more or less serrated rarely entire, veins twice forked, sori in two rows subglobose.—*Linn. Sp. Pl. p. 1544. Sw. Syn. Fil. t. 11. Schk. Fil. t. 11. Willd. Sp. Pl. v. p. 172. Hook. et Arn. Brit. Fl. ed. 8. p. 1149. Metten. Polypod. p. 61. Hook. Brit. Ferns, t. 2. P. Virginianum, Linn. Sp. Pl. p. 1544. Sw. Syn. Fil. p. 34. Willd. Sp. Pl. v. p. 174. Pursh, Am. ii. p. 658. P. australe, Fée, Gen. Fil. p. 236. t. 20. f. 2. P. cambricum, Linn. Sp. Pl. p. 1546 (abnormal form, with more or less pinnatifid segments). P. serratum, Willd. l. c. p. 173.*

Hab. Common throughout most of the cold and temperate regions of the globe: Europe, to its extreme south; North Africa, Madeira, Canaries, and Azores, where it generally attains a large size; Siberia, the Amur, Manchuria, Japan (unknown in the tropical continent of Asia, or even in the Himalaya). From Erzeroum, Asiatic Turkey, I possess specimens; North America, United States, and Canada, British North America and north to Sitka, rare in California (*A. B. Eaton*), *Galeotti*, mountains, 5000 feet, n. 6552 (frond exactly ovate,  $4\frac{1}{2}$  inches long; segments close, nearly  $\frac{1}{2}$  an inch broad, very obtuse, two lower segments reflexed), south to Mexico; but I do not know of its existence further south in the new world. It makes its appearance in the Cape Colony, South Africa (*Bolton*).—Although varying a good deal in size, and in greater or less breadth of the segments, etc., this is a species in general easily recognized.

101. P. (*Eupolypodium*) *ellipsoideum*, Fée; "caudex elon-

gated thick as a goose-quill flexuose clothed with lanceolate long acuminate scales broad at their base, fronds pinnatifid (pinnate below according to the figure) hairy, segments lanceolate acute entire slightly curved below ciliated, the sinuses rounded rather broad, sori golden-colour close-placed near the margin but distinct ellipsoid, capsules subrotund, annulus of fourteen articulations, spores ellipsoid." *Fée, 6me Mém. Foug. Nouv. p. 57. t. 21. f. 1.*

Hab. Mexico, on mountains, elev. 12,000 feet, *Schaffner*.—"A beautiful flexile Fern, habit and size of *P. vulgare*." The veinlets are represented as patent, once or twice forked obliquely; the elliptical sori have the same direction and terminate the superior basal branch of the vein.

102. *P. (Eupolypodium) Abitaguae*, Hook.; caudex rather stout short creeping? densely clothed with ferruginous erect linear subulate straight somewhat rigid scales, stipites 6 inches to a span long rather stout firm and as well as the rachis purple-black ferruginously pilose, fronds coriaceous-membranaceous subpellucid 1 foot long 3-4 inches broad broad-lanceolate acuminate deeply pinnatifid almost to the rachis, segments 2 inches long  $\frac{1}{4}$  of an inch wide from a broad base decurrent below (forming sharp sinuses) sublanceolate gradually acuminate slightly falcate, the margin entire or obscurely repand hairy at the margin and ciliated with dark-brown long hairs the rest glabrous, veins internal black (as well as the costule) distinctly seen on being held between the eye and the light rather distant oblique once-forked, upper and shorter branch bearing the sorus thus forming a series of sori intermediate between the costule and margin.

Hab. On trees, Abitagua, Ecuador, *Spruce*, n. 5281.—A *Polypodium* with a good deal of the habit of *P. vulgare*, but with the segments much more acuminate, the margin strongly ciliated with almost black hairs; the veins are internal, black, and all once forked; the scales of the caudex almost  $\frac{1}{2}$  an inch long, peculiarly straight (not at all crisped); and the stipites and rachis are deep, purple-black, and ferruginously pubescent.

103. *P. (Eupolypodium) pellucidum*, Klfs.; caudex creeping thick ferrugineo-paleaceous, stipites approximate stout testaceous 4-5 inches long, fronds ovate or oblong very firm and coriaceous a span to a foot long 3-5 inches broad deeply nearly to the rachis pinnatifid, segments oblong or linear-oblong  $\frac{1}{3}$  of an inch wide very obtuse approximate subhorizontally or rarely erecto-patent margined crenato-dentate or serrate the lower base a little decurrent, veins erecto-patent twice or thrice dichotomous pellucid and there are besides

pellucid striæ or spurious veins, sori copious round or oval often confluent.—*Kaulfs. En. Fil.* p. 101. *Gaudich. in Freyc. Voy. Bot.* p. 356. *Hook. et Arn. Bot. of Beech. Voy.* p. 103. *Hook. Ic. Pl.* t. 944. *Brack. Fil. U. St. Expl. Exp.* p. 10.—Var. *bipinnatifidum*; frond elongate bipinnatifid. *Hook. Ic. Pl.* t. 945. *P. myriocarpum*, *Hook. Ic. Pl.* t. 84.

Hab. Sandwich Islands, *Chamisso, Douglas, Beechey, Diell, Hillebrand, Brackenridge* (elev. on the mountains, 8000 feet).—There is a peculiarity in this plant which I have not observed in any other Fern. The frond is thick and opaque, but the veins are pellucid, and of a rich tawny colour, when held between the eye and the light; and, besides the free veinlets, clavate at the extremity, of which the first superior branch bears the sorus, there are pellucid striæ or pseudo-veins, always communicating with a crenature or sinus of the marginal teeth, often as conspicuous as the true veins.

104. *P. (Eupolypodium) Hartwegianum*, *Hook.*; caudex stout creeping densely clothed with dark-brown glabrous falcate subulate scales, stipes 4 inches long greenish-brown glabrous, frond a foot long  $3\frac{1}{2}$  inches broad oblong-lanceolate firm-membranaceous acuminate opposito-pinnate only at the base, the rest deeply pinnatifid upwards, segments alternate and as well as the pinnæ horizontal rather distant with broad sinuses, the bases above and below more or less decurrent oblong-lanceolate somewhat acute entire or subsinuato-crenate, lowest two pairs of pinnæ deflexed scarcely abbreviated at the base, above having a truncated auricle, costule slender black, veins black slender twice forked, sori on every segment and pinnæ nearer the margin than the costule bright-yellow oval transversely oblique, rachis brown and as well as the costule (and occasionally the veins) pubescent.—*P. Hartwegianum*, *Hook. in Benth. Plant. Hartweg.* p. 55, and in *Ic. Pl.* t. 390.

Hab. Mexico, on the mountain Sumata, elev. 9500 feet, *Hartweg, n.* 415.

105. *P. (Eupolypodium) Martensii*, *Metten.*; “caudex creeping stout clothed with rather large reddish membranaceous flaccid acuminate serrulated scales, stipes 1 inch long pubescent, frond membranaceous pubescent on both sides 5–6 inches long lanceolate or oblong-acuminate pinnatifid to the costa, segments 10 lines long 2 lines wide elongato-oblong or oblong obtuse entire, lower ones distinct, lowest a little abbreviated adnate at the attenuated base, upper ones contiguous, sori intermediate between the costa and the margin 6–8 on each side, capsules loosely collected bearing 2–4 very long hairs at the top thrice as long as the

capsule." *Metten. Polypod. p. 61.*—*P. affine, Mart. et Gal. Fil. Mex. p. 37. t. 8. f. 1 (not Blume).*

Hab. Mexico: Orizaba, 9,000–10,000 feet, *Ehrenberg, n. 6453*; Xalapa and Real del Monte, *Coulter, n. 1708 and 1705*: San Felipe, *Andrieux, n. 36.*—Mettenius unfortunately makes no allusion to the affinity of this species; but Martens and Galeotti candidly acknowledge its close affinity with *P. vulgare*, "but the frond is pilose and segments subentire." My specimens from Coulter and from Andrieux quite agree with the figure above referred to, and I had certainly only considered them a slightly pubescent form of *P. vulgare*. The specimens, however, want the caudiform apex so common to that species.

106. *P. (Eupolypodium) chnoophorum, Kze.*; "caudex repent clothed with reddish lanceolate acuminate scales, stipes 2 inches long, fronds everywhere especially at the costæ clothed with white hairs, 1 foot long lanceolate pinnatipartite to the costa, segments  $1\frac{1}{2}$ – $1\frac{1}{8}$  inch long 4– $4\frac{1}{2}$  lines wide oblong or elongato-oblong-lanceolate rather obtuse subfalcate acuminate repando-sinuate or subcrenate, the base dilated on both sides, the superior adscendenti-coadunate decreasing at both extremities, lowermost subremote distinct a little deflexed." *Metten.—Kze. Bot. Zeit. 1839. Beibl. 1. 34. Metten. Polyp. p. 60.*

Hab. Brazil, *Blanchet.*

\*\*\* *Fronds pinnatifid, or pinnate, or even bipinnatifid, more or less furfuraceous, with often peltate fringed scales, of which P. incanum may be considered the type. (Lepidotæ.—107–122.)\**

107. *P. (Eupolypodium) incanum, Sw.*; "caudex creeping clothed with adpressed lanceolato-subulate rigid finely ciliated or glabrous scales, stipes 1–4 inches long, fronds subcoriaceous 2–5 inches long ovato-oblong deeply pinnatifid on the upper side sparingly clothed with ovate or rotundate denticulated scales bristle-pointed eventually naked, on the under side together with the stipes densely squamose with membranaceous rotundate or ovate obtuse or acuminate entire or denticulated scales, segments  $\frac{1}{2}$ –1 inch long  $1\frac{1}{2}$ –2 lines wide diminishing from the base to the apex or the lowest ones a little abbreviated, the superior base broader, inferior base attenuated and decurrently adnate and confluent by means of a narrow wing elongato-oblong obtuse or lanceolato-oblong generally entire, sori impressed generally near the apex of the segments 4–6 on each side the costule near the margin

\* A small but natural group, though varying in ramification; the frond, generally thick and opaque, renders it difficult to detect the true character of the venation, which is sometimes considered to be that of § *Goniopteris*.

enclosed by the scales." *Metten.*—*Sw. Syn. Fil. p. 35. Willd. Sp. Pl. v. p. 174. Metten. Polypod. p. 69. Asa Gray, Man. of Bot. Illustr. p. 590. Marginaria, Pr. Goniophlebium and Lepicystis, J. Sm. P. velatum, Schk. Fil. t. 11. b. Marginaria minima, Bory, Crypt. p. 364. t. 31. 2. P. ceterachinum, Mich. Acrostichum polypodioides, L. P. microlepis, Fée, 6me Mém. Foug. Nouv. p. 8. t. 6. f. 2 (small stunted form).*

Hab. Throughout tropical America, as far south as Atacama in Chili (*Philippi*); Mexico; the West Indian Islands; frequent in the Southern States of North America, and as far north as Ohio and Illinois (*A. Gray*). Galapagos Islands, Pacific, *Capt. Wood*. Tropical East Africa, Moramballe Mountain, alt. 3000-3500 feet, *Dr. Kirk, in Livingstone's Exp.*

108. *P. (Eupolypodium) Eckloni*, Kze.; "caudex creeping paleaceous with appressed rigid lanceolato-subulate blackish entire scales fuscous at the margin, stipites 2-4 inches long, fronds subcoriaceous above at length naked, below densely appressed-squamose (scales membranaceous ovate obtuse or acute entire brown in the middle pale at the margin) 4-6 inches long ovato-lanceolate deeply pinnatifid, segments 8 lines to  $1\frac{1}{2}$  inch long  $1\frac{1}{2}$ -2 lines wide, the superior base broader, inferior attenuated and decurrent adnate and confluent by a narrow wing elongato-oblong obtuse entire, veins of *Eupteris* immersed, sori generally occupying the apices of the segments impressed surrounded by scales, 3-6 on each side the costule near the margin." *Metten.*—*Kze. in Linnæa*, x. p. 498. *Metten. Polypod. p. 68. Pappe and Rawson, En. Fil. Cap. p. 39.*

Hab. South Africa, chiefly in the eastern districts, Uitenhage to Natal, *Ecklon and Zeyher, Pappe, Garden, Krauss, Sanderson* (Macalisberg, alt. 4000-5000 feet, and Glen Ayres, alt. 1000 feet, from *J. Ayres, Esq.*).—I do not myself at all see how the present species is to be distinguished from the preceding, and yet no one seems to have thrown a doubt on its being different. It is true, *Mettenius*, who has given very full specific characters (transferred here) of the two, places one (*Eckloni*) among free-veined species, the other (*incanum*) among the *Marginaria*-group "Nervi anastomosantes;" but his var. *a* of the latter is characterized by having the "nerves free."

109. *P. (Eupolypodium) squamatum*, L.; caudex creeping thick as a goose-quill paleaceous with brown appressed subulato-lanceolate imbricating scales, stipites 2-12-14 inches long stout firm furfuraceous with white or tawny scales dark-brown in the centre, fronds 6 inches to 1 foot long 2-4 inches wide thick firm oblong or ovato-oblong subcaudato-acuminate pinnate subpinnatifid at the apex, sparingly fur-

furaceous above with appressed scales, copiously so beneath where they are persistent whitish or pale tawny colour squarrose ovato-acuminate hair-pointed toothed or beautifully ciliated dark-brown in the disk, pinnæ and segments generally few 11–15 (rarely 30) distant especially the inferior ones 1–2½ inches long oblong or subspathulato-oblong obtuse the very base broad-adnate and decurrent especially at the inferior base (venation of *Marginaria*, Mettenius, Fée), sori frequent dark-brown arranged between the costule and margin very much concealed by the scales.—*Linn. Sp. Pl.* p. 1546. *Willd. Sp. Pl.* v. p. 190. *Sw. Syn. Fil.* p. 35. *Metten. Polypod.* p. 70. *P. thysanolepis*, *A. Braun*, in *Kl. Linnæa*, xx. p. 392. *Metten. Polypod.* p. 70. *P. rhagadiolepis*, *Fée*, *Gen. p.* 237. *Goniophlebium rhagadiolepis*, *Fée*, *6me Mém. p.* 62. *t.* 19. *f.* 3 (*very characteristic of the normal form*). *Plum. Fil.* p. 61. *t.* 79?

Hab. Hispaniola, *Plumier*. Mexico, apparently frequent on mountains, alt. 7000 feet, *Galeotti*, n. 6545 and 6422, *Jurgensen*, n. 690, *Linden*, n. 61. Venezuela, *Fendler*, n. 219, 252. New Grenada, alt. 7000 feet, *Schlim*, n. 847 (more numerous pinnæ, approaching *P. furfuraceum*, but very different in the paleæ). Caraccas, *Otto*, n. 896 (from *Klotzsch*, an original specimen, quite like the figure of Fée), *Linden*, n. 515. Chacapoyas, Peru, *Mathews*, n. 3281. Andes of Ecuador, *Spruce*, n. 5235, *Jameson*, n. 3482 (one specimen passing into *P. tridens*).—The ordinary form, with few segments and subspathulate segments, is a very distinct-looking plant, and the scales are copious and *very* squarrose beneath. In the so-called *P. thysanolepis* they are not close-placed, and are very permanent; such specimens look like overgrown forms of *P. incanum*, and they certainly are not more unlike that species than the type of the species, *Plumier's* figure, is to our present plant, if it be not awfully exaggerated in the plate 79, where the frond is given as 2 feet 5 inches long (without the stipes), with 77 pinnæ 3 inches long and nearly half an inch wide! Yet in other respects the figure is satisfactory.

110. *P. (Eupolypodium) tridens*, *Kze.*; “frond linear-oblong coriaceous pinnate, lowest pinnæ petiolate, superior ones sessile, all alternate patent ovate in circumference cuneate at the base tripartite, their segments lanceolate obtuse, beneath very thickly fuscous- above laxly-white furfuraceo-scaly segments soriferous in the apex of the frond, sori uniseriate rather plane middle-sized, stipes of moderate length lepidotous and hairy paleaceous at the base.” *Kze.*—*P. (Marginaria) tridens*, *Kze. in Schk. Fil. Suppl.* i. p. 23. *t.* 13. *f.* 1. *Metten. Polypod.* p. 70.

Hab. Galapagos Islands, *Cuming*, n. 112; Chatham Island, of the same group, *Capt. Wood*.—Kunze has well described and well figured one state of this, with deeply forked or tripartite segments. My very fine specimens in that condition are from Mr. Cuming and Capt. Wood, but accompanied by others of the same

species with perfectly simple and undivided pinnæ, which I take to be the really normal state of the plant, as the *Polypod. vulgare* is the type of the *P. Cambricum* and its various abnormal forms. The plant is most variable in size, with fronds not 3 inches long by 2 wide, wholly pinnatifid, to a length of nearly  $1\frac{1}{2}$  foot and a diameter of 5 inches. In all, the scales of the upper side of the frond are multifidly ciliate with a long spicule-like apex, or formed of stellate hairs, all more or less deciduous; those of the under side are subovate, close-pressed, ciliated, white with a dark disk. It is very like to prove an abnormal form of *P. squamatum*, L.

111. *P. (Eupolypodium) lanosum*, Fée; "fronds linear, segments obtuse contorted opaque cartilaginous, when dry subcontorted, clothed above with very long white hairs at the base mixed with scattered scales, beneath densely clothed with soft reddish long wool, superior segments alone fertile, sori thick and confluent 3-4 in each segment, capsules ovate, annulus with 12-13 articulations, spores thick oval."—Fée, *Gen. Fil. p. 237. Metten. Polypod. p. 69.*

Hab. "Chili. A singular elongated Fern, with short segments, resembling the pods of some *Ervum* or *Vicia*." Fée.

112. *P. (Eupolypodium) lepidopteris*, Kze.; caudex long creeping stout clothed with ferruginous ciliated or glabrous subulate scales, stipites distant short 1-3 inches long scaly, fronds subcoriaceous stout generally very short 1-4 inches long, fronds 3 inches to nearly  $1\frac{1}{2}$  foot long 1-2 rarely 3 inches broad lanceolate or linear-lanceolate caudato-acuminate subcoriaceous in general remarkably attenuated at the base by the dwarfing of the pinnæ often to within an inch of the caudex pinnated below, above the middle more or less pinnatifid, while young and the fronds not fully developed clothed with very long glossy almost golden paleaceous hairs, in age the clothing is singularly variable sometimes composed chiefly if not entirely of the ovate ciliated hair-pointed appressed peltate pale scales brown in the disk so common to this group, more frequently accompanied with long paleaceous hairs more or less abundant and very copious and persistent on the under side varying in colour from ferruginous to white, pinnæ approximate varying extremely in length and breadth horizontally patent broad-adnate and more or less decurrent at the base ovate and frequently singularly undulato-sinuate at the margin at other times oblong or oblong-linear or subspathulate and entire, lowest ones singularly and gradually abbreviated, (venation of *Marginaria*, Pr.) sori in two rows intermediate between the costule and



the margin more or less concealed by the copious scales and hairs.—*Kze. in Linnæa*, xiii. p. 132. *Metten. Polypod.* p. 71. *Acrostichum, Langsd. et Fisch. Fil.* v. t. 2 (*young and imperfect*). *Willd. Sp. Pl.* v. p. 113. *Polypod. hirsutissimum, Raddi, Fil. Bras.* p. 17. t. 26. *Bory, Voy. Dup. Crypt.* p. 262. t. 32. *P. sepultum, Kaulf. En. Fil.* p. 104. *Gonio-phlebium and Lepicystis, J. Sm.* *P. tricholepis, Schrad.* *P. Raddii, Desv.* *P. rufulum, Pr. Del. Prag.* *Marginaria, Pr. Tent. Pterid.* p. 189.

Hab. Tropical America, abundant: Brazil, *Gardner*, n. 5288, 24, *Tweedie*, n. 559 (South Brazil), *Brackenridge, Raddi*, n. 41, *Spruce*, n. 3798 (Rio Negro). Guiana, *Schomburgk, and others.* Isle of Trinidad, South Atlantic, *Lefroy.* Central America, *Cuming*, n. 1284. Panama, *Seemann*, n. 982. Venezuela, *Fendler*, n. 343 (a very beautiful var.; the tuft exhibits the young fronds aureo-nitent, and the old ones with scales apparently bleached white with age). Mexico, *Seemann*, n. 1933 (pinnæ not dwarfed at the base: *Lepicystis sepultum, J. Sm. in Seem. Bot. of the Herald*). Vera Cruz, on Oaks, 3500–5000 feet, n. 6276 and 6308, *Galeotti.* Tarapota, Eastern Peru, *Spruce*, n. 4654. Galapagos, *Capt. Wood.*—If, as I quite think, all the references I have brought under this species be correct, it is hard to say what are the limits of species among Ferns. If we take the opposite extremes here brought under review, they look most distinct even as to form, though I believe the most dependable marks to be derived from the long-attenuated base of the frond, owing to the gradual dwarfing of the lower pinnæ; yet this character is not constant, and the variation observed in the paleaceous clothing of the fronds is quite remarkable, and may contribute to throw doubts on the stability of other generally acknowledged species of this group.

113. *P. (Eupolypodium) sporadolepis, Eat. (not Kze. ?)*; caudex long creeping thick as a goose-quill almost black thick paleaceous at the extremity with dark-brown close-pressed subulate scales, stipites dark-brown almost black glossy decidedly scaly, fronds 6 inches to a foot long 2–4 inches wide oblong-acuminate truncate at the base coriaceous-membranaceous opaque, naked above, beneath scurfy with small dirty-brown scales, pinnated nearly to the apex and terminated by a caudate pinna pinnatifid at its base, pinnæ horizontal remote distant  $\frac{1}{2}$ – $\frac{3}{4}$  of an inch apart from a contracted base linear-oblong obtuse entire scarcely repand at the margin (sterile fronds rather pinnatifid than pinnate with broader and subspathulate segments), sori copious in two series halfway between the costule and the margin sometimes covering the whole back of the pinnule, rachis black scurfy with dirty-looking scales.—*P. sporadolepis, var. β, Eaton, in Fil. Wright. et Fendl.* p. 198, name only (*surely not Kze. in Metten. Polyp. p. 67*).

Hab. Tovar, Venezuela, *Fendler*, n. 246, Ecuador, Pichincha, *Jameson*, n. 17 and 271 (one specimen with the barren fronds deeply pinnatifid, while the fertile ones

are equally pinnate with very remote pinnæ; Huataai, on trees, *Spruce*, n. 5674. —Mettenius is the only person who has described the *P. sporadolepis* of Kze. Herb., with the following synonyms:—His var.  $\alpha$  is *P. Tweedianum*, Hook., since properly referred by him to *P. macrocarpum*. His var.  $\beta$  is our *P. murorum*, and his var.  $\gamma$  is *P. macrosorum* of Fée, Mém. vi. p. 11. t. 8, and consequently our *P. onustum*. The species I here introduce is so named by Mr. Eaton, and possibly confirmed by Dr. Mettenius. If so, and if I am correct in my views of the Ferns referred to that species by Mettenius, the name may be preserved to the plant of Eaton. But this again comes so near to some states of *P. plebejum*, that, if left to my own choice, I should perhaps have referred it there. Both of them are the least scaly of the group. My specimens from Jameson and Spruce quite accord with the *P. sporadolepis* of Eaton, l. c.

114. *P. (Eupolypodium) plebejum*, Schlecht.; caudex stout creeping ferrugineo-squamose, stipites dark-brown 3–6 inches long distant margined (in the living plant) with an obscure decurrent wing, fronds subcarnose coriaceous-membranaceous 6 inches to a span long broad-oblong scarcely acuminate naked above, beneath clothed with scattered ovate acuminate appressed subpeltate scales deeply nearly to the rachis pinnatifid, the segments horizontally patent linear-oblong often narrower at the base so as to be subspathulate more or less acute or obtuse subcrenato-serrate, lowest ones free, veins immersed indistinctly visible once or twice forked all free, sori subrotund or oval in two rows halfway between the costa and the margin.—*Schlecht. in Linnæa*, v. p. 607. *Kze. in Linnæa*, xviii. p. 319. *Liebm. Fil. Mex.* p. 46. *Hook. Gard. Ferns*, t. 48. *P. leucostichum*, *Kze. in Linnæa*, xx. p. 380. *P. Karwinskianum*, *Metten. Polyp.* p. 66. *Eat. in Fil. Wright. et Fendl.* p. 198. *Marginalia*, Pr.

Hab. Mexico, on mountains, alt. 3,000–11,000 feet, *Harris*, *Galeotti*, n. 6277, *Liebm.* Guatemala, Vera Paz, *Salween*. New Grenada, *Moritz*, n. 336, *Hartweg*, n. 1499, *Fendler*, n. 252. Andes of Quito, *Jameson*, n. 14, *Spruce*, n. 5239 (large). Peru, *Maclean*. Trees on Organ Mountains, Brazil, *Gardner*, n. 5920.—*P. plebejum* is the first name of this Fern published with a description, and was so called from its resemblance to our common Polypody (*P. vulgare*). It is however, in reality, more nearly allied to *P. incanum* and its affinities.

115. *P. (Eupolypodium) furfuraceum*, Schlecht.; “caudex creeping clothed with largish ovato-lanceolate pale-reddish laxly imbricating scales, stipes 1–2 inches long, fronds 4 inches to 1 foot long linear (1½ foot long and 5 inches wide and oblong in our specimen) acuminate deeply pinnatifid (pinnate in the lower half) subcoriaceous on both sides as well as the stipes scaly with whitish (brown in the disk) tender ovate acute elegantly ciliated scales, on the under side most densely imbricated, above sparse acuminate-

setose and long ciliated, segments numerous 6 lines long  $1\frac{1}{2}$  line wide (in our specimen 3 inches long  $\frac{1}{4}$  of an inch wide) at the base on each side especially above manifestly dilated and confluent linear-oblong (gradually attenuated) rather obtuse, veins immersed of *Eupteris* (free), sori (partly) concealed by the scales submarginal (halfway between the costule and the margin) extending from the base to the apex of the segments 8-12 on each side the costa." *Metten.—Schlecht. et Cham. in Linnæa*, v. p. 607. *Metten. Polypod. p.* 68. *Liebm. Fil. Mex. p.* 37.

Hab. Mexico, *Schiede and Deppe*. Mirador, *Liebmann*, in *Herb. nostr.*—I possess a very fine specimen of the frond of this from Liebmann, with a portion of the very stout stipes, and I can verify by it the correctness of the greater part of Mettenius's character. The chief differences are in the dimensions; mine measures more than  $1\frac{1}{2}$  foot (19 inches) in length, and the segments are large in proportion; the rachis is very stout. Indeed, it exhibits the longest fronds of any of this group, and is stout in proportion.

116. *P. (Eupolypodium) Madrense*, J. Sm.; caudex stout creeping tortuous paleaceous with copious crisped ferruginous scales, stipites scattered  $2\frac{1}{2}$ –4 inches long fuscous paleaceous with subulate scales, fronds subcoriaceous (very yellow when dry) 3–4 inches long  $1$ – $1\frac{1}{2}$  inch broad oblong-ovate deeply nearly to the rachis pinnatifid naked above copiously scaly beneath with appressed ovate subferruginous scales dark in the disk, segments horizontal linear-oblong obtuse with a thickened margin, veins immersed twice forked free, sori copious approximate on the segments in two rows one on each side the costa, rachis dark-brown paleaceous.—*J. Sm. in Seem. Bot. of the Herald*, p. 338. t. 73 (*figure excellent*).

Hab. Sierra Madre, North-west Mexico, *Seemann*.—This clearly belongs to the same group of *Polypodium* as *P. incanum* and its allies; and is remarkable for its peculiarly yellow colour when dry and the thickened margin of the segments.

117. *P. (Eupolypodium) Skinneri*, Hook.; caudex long creeping thickness of a crow-quill paleaceous with ferruginous ovate rather lax erose scales, stipites furfuraceous with appressed scales  $1\frac{1}{2}$ –2 inches long distant, fronds subcoriaceous-membranaceous rather flaccid subfalcate 6 inches to a span long  $1\frac{1}{2}$  to nearly 2 inches wide pinnate nearly to the apex linear-oblong acuminate and subcaudate, on both sides copiously clothed with appressed pale-brown ovate acuminate beautifully ciliated scales darker-brown in the centre, segments numerous scarcely an inch long  $\frac{3}{4}$  of a line wide ho-

rizontally patent rather distant linear-subulate but obtuse entire subsinuate when fertile, sori rather distant submarginal but the two series almost meet at the costule and project at the margin and are almost entirely concealed by the scales, rachis very furfuraceous. (TAB. CCLXXXVI. B.)

Hab. Guatemala, *G. U. Skinner, Esq.*—A very elegant and distinct species, the slenderest of the group, very furfuraceous with beautiful scales.

118. *P. (Eupolypodium) fallax*, Schlecht.; caudex very long creeping filiform rooting with copious tomentose fibres, stipites remote distant  $\frac{1}{2}$ –1 inch long scarcely paleaceous, fronds 1–1 $\frac{1}{2}$  inch long  $\frac{1}{2}$  an inch wide coriaceous-membranaceous oblong-acuminate paleaceous with scattered subovate appressed toothed deciduous scales pinnated, pinnæ 11–15 distant oblong cuneato-attenuate at the base inciso-subpinnatifid erecto-patent, segments unequal entire or subbifid, veins forked once or twice, sori few large near the apex of the segment terminal on a veinlet.—*Schlecht. in Linnæa*, v. p. 609. *Fée, Gen. Fil. pp. 99 and 236. t. 10. A. 2. Mart. et Gal. Fil. Mex. p. 44. Metten. Polyp. p. 64. t. 1. f. 4–6 (fragments).*

Hab. Mexico, on mountains, 4000–7000 feet of alt., Vera Cruz, Puebla, etc., *Harris, F. Müller, Linden, n. 27 and 159, Galeotti, n. 6327.*—A most distinct but small species, with long, filiform, entangled, rooting caudices.

119. *P. (Eupolypodium) macrocarpum*, Pr.; caudex stout for the size of the plant creeping copiously rooting clothed above with ferruginous scales, stipites remote tawny 2–4 inches long rigid scabrous with small scales, fronds 2–4 inches long  $\frac{1}{2}$  an inch to an inch wide thick and fleshy very firm and coriaceous when dry, subovate or oblong bluntly acuminate naked above copiously scaly beneath with ovate acuminate peltate reticulated appressed scales angulato-dentate at the margin deeply beyond the middle pinnatifid, segments patent 5–21 oblong obtuse more or less approximate subserrate, costules immersed represented by a depressed line or furrow, veins altogether immersed and invisible, sori large copious occupying most of the segments in two series.—*Pr. Reliq. Hænk. i. p. 23. t. 1. f. 4. Kze. in Schk. Fil. Suppl. i. p. 25. t. 13. f. 2. Hook. Ic. Pl. t. 934. Metten. Fil. p. 66. Pleopeltis pinnatifida, Gill. in Hook. et Grev. Ic. Fil. t. 57. Polyp. Tweedianum, Hook. Ic. Pl. t. 86 (larger form, with more numerous and narrower segments). Goniophlebium,*

*J. Sm.* Polyp. sporadolepis,  $\alpha$ , *Metten. Polypod. p. 67* (according to his reference).

Hab. Andes of Peru, Bolivia, and Chili, *Henke, Gillies, Mathews* (San Luis), n. 600, *Tweedie* (Tucuman), *Cuming*, n. 600, *Maclean, Brackenridge, Lechler*, n. 2009. Island of Massa Fuera, *Cuming*, n. 1352.—*Mettenius*, in his monograph of *Polypodium*, unites my *P. Tweedianum* with *P. sporadolepis*, Kze. I agree most fully with him in a subsequent observation, that it should rather be referred to *P. macrocarpum*. Pr.

120. *P. (Eupolypodium) murorum*, Hook.; caudex rather stout long creeping paleaceous with linear-subulate rather crisped scales, stipites distant 4–6 inches long furfuraceous as well as the whole under side of the plant with more or less copious and deciduous scales, fronds coriaceous 4–6 inches long ovato-oblong acuminate pinnatifid at the acuminate apex, pinnæ rather distant  $1\frac{1}{2}$  inch long from a contracted and subpetiolated base narrow oblongo-lanceolate more or less deeply and regularly pinnatifid (rarely broader near the base in the lowest pair of pinnæ and then very deeply pinnatifid), segments short subovate obtuse mostly entire, veins sunk obscure, sori copious large subglobose one or more on every segment.—*Hook. Ic. Plant. t. 70* (very characteristic). *P. sporadolepis*,  $\beta$ , *Metten. Polypod. p. 67* (according to his reference to *Hook. Ic. Pl.*).

Hab. Quitinian Andes, *Jameson* (on walls); on trees at Guayrapata, *Spruce*. New Grenada, *Purdie, Moritz*, n. 361, *Hartweg, Schlim*, n. 449 and 874; Bogotá, *Holton*. Caraccas, *Linden*, n. 507.—The much less compound frond of this, with the almost regularly and not very deeply pinnatifid pinnæ, are what chiefly distinguish this from *P. onustum*; there are modifications, indeed, of these forms, but I have never had a difficulty in distinguishing the two.

121. *P. (Eupolypodium) onustum*, Hook.; caudex long creeping branched thick as a duck's quill clothed with subulate imbricated scales, stipites distant 4–6 inches and more long and as well as the under side of the plant subfurfuraceous with close-pressed deciduous ovate scales, fronds coriaceous 5–6 inches long oblong-ovate acuminate bipinnate, primary pinnæ petiolate ovato-lanceolate, pinnules  $\frac{1}{4}$ – $\frac{3}{8}$  of an inch long scarcely petiolate oblong pinnatifid with short ovate unequal rather obtuse entire or rarely sublobed segments, venation sunk indistinct, sori very large prominent subglobose one on almost every lobule and generally broader than the segment. *Hook. Ic. Plant. t. 749. Metten. Polypod. p. 68. t. 1. f. 15* (fragment). *P. macrosorum*, *Fée, Gen. Fil. p. 241. 6me Mém. Foug. p. 11. t. 8. f. 1.*

Hab. Andes of Ecuador, *Jameson*, *Hartweg*, n. 1501, *Spruce*, n. 5327. Parano de Pamplona, New Granada, *Purdie*. Venezuela, *Funck and Schlim*, n. 1367 (*vide Metten.*).—This belongs to the same group as *P. Fredericksthalianum* and *P. murorum*; it is much less finely divided than the former, and more compound than the latter, yet very distinct, I think, from both. *Fée's P. macrosorum* is identical with this, and equally with my original specimens of *P. onustum* from Quito (*Jameson*), and is an excellent representation of the narrowest-segmented form, while my figure exhibits that with the broader and shorter segments. *Mettenius*, singularly enough, as it appears to me, places my *P. Tweedianum*, Ic. Pl. t. 86, and *P. murorum* (n. 120), together with *P. macrosorum* of *Fée* (which he therefore considers distinct from *onustum*), as separate varieties of *P. sporodolepis* of *Kze. Herb.* (a previous unpublished plant), possessing three different kinds of venation and of insertion of the sori; viz.  $\alpha$ . *P. Tweedianum*, Hook., "nervi repetito-furcati; rami antici apice vel dorso medio soriferi;"  $\beta$ . *P. murorum*, Hook., "laciniae (pinnae) nervum repetito-furcatum excipientes, plerumque ad furcatum rami antici soriferi;"  $\gamma$ . *P. macrosorum*, *Fée*, "laciniae nervum furcatum excipientes, in dorso vel apice rami antici soriferae." The nature and opacity of the frond renders it very difficult to confirm the correctness of these distinctions, and unnecessary, inasmuch as there are, as appears to me, tangible characters, independent of them, for specific distinction.

122. *P. (Eupolypodium) Fredericksthalianum*, *Kze.*; caudex long creeping paleaceous nearly as thick as a writing pen, stipites 4–6 inches long rather stout and as well as the whole under side of the plant furfuraceous with pale-coloured ovate toothed silvery appressed scales, frond subcoriaceous 10–16 inches long ovato-oblong or oblong 2–4 inches broad bipinnate quite naked on the upper side, primary pinnae subovate acuminate petiolate, pinnules all linear obtuse  $\frac{1}{2}$  an inch and more long distant with generally short spreading obtuse subspathulate segments, veins solitary costuliform following the course of the segments, sori subglobose terminal on a veinlet.—*Kze. in Schk. Fil. Suppl. ii. p. 55. t. 123. Metten. Polypod. p. 65. t. 1. f. 17 (fragments).* *P. Lindenianum*, *Kze. Fil. Suppl. ii. p. 83. t. 134. Metten. Polypod. p. 65. P. cancellatum*, *Fée, Gen. Fil. p. 242. 6me Mém. Foug. p. 12. t. 7. f. 2.*

Hab. Guatemala, *Linden* (*Kze.*); Vera Paz, *Salwyn*. Mexico: Chiapas, *Linden*, n. 1528 and 1540 (*in Herb. nostr.*).—A very elegant Fern; but I fear the two supposed species described and figured by *Kunze*, in reality are but slight varieties of one and the same.

\*\*\*\* Fronds pinnate, or pinnatifid only towards the apex. 123–143.

(Caudex scandent. Stipes jointed above the base. *Arthropteris*, *J. Sm.* 123–124.)

123. *P. (Eupolypodium) tenellum*, *Forst.*; caudex very much elongated scandent woody, the younger portion clothed with black ovate scales bordered with brown, stipites scattered distant generally short 1–3 inches long tawny

jointed above the base, fronds 1-2 and even 3 feet long 2-6 inches broad pendent subcoriaceous-membranaceous flexuose elongato-oblong pinnated, pinnæ 1-3½ inches long ½-¾ inch wide remote spreading lanceolate long- or short-acuminate very obliquely cuneate at the base and there tapering into a short petiole the margin entire or crenate, terminal one quite free and petioled, costule slender, veins twice or thrice forked branches parallel, sori in two series a little within the margin globose, rachis tawny.—*Forst. Prodr. p. 440. Willd. Sp. Pl. v. p. 185. Sw. Syn. Fil. p. 38 and 233. Schk. Fil. p. 15. t. 16. Br. Prodr. p. 147. Metten. Polypod. p. 64. P. marattioides, "Klf. Syn. Fil." Arthropteris tenella, J. Sm. in Hook. fil. Fl. Nov. Zeal. ii. p. 43. t. 82.*

Hab. Pacific Islands, *Forster (Swartz)*. Isle of Pines and Lord Howe's Island, *Milne and Macgillivray*. New Zealand, N. Island, *Dr. Hooker, Logan, Colenso*. Norfolk Island, *Al. Cunningham, C. J. Simmons, Milne*. Australia: Port Jackson, *Brown*; Brisbane and Hastings Rivers, *Al. Cunningham, Müller*; and Clarence River, *Dr. Beckler*.—A climbing plant, running over the trunks of trees, very different from the following but equally scandent species.

Mr. J. Smith has an "*Arthropteris? filipes*, of T. Moore, in Gard. Chron. for 1855, p. 368, native of New Zealand?" I find none such there recorded. On the contrary, Mr. Moore (*Index Fil. p. 84*) has an "*Arthropteris filipes*," of J. Sm., which he refers to "*Polypodium filipes*."

124. *P. (Eupolypodium) alte-scandens*, Coll.; caudex very long scandent more or less scaly, stipites scattered 3-4 inches long jointed a little above the base stramineous downy and tapering fusco-squamose, fronds (erect?) firm-membranaceous 6-10 inches long 1½-2 inches broad oblong-lanceolate rather obtuse pinnated, pinnæ subhorizontal close-placed from an obliquely cuneate base truncated and mostly auricled above oblong obtuse pinnatifido-serrate, costule slender pubescent, veins conspicuous prominent beneath, one to each lobule or segment which is only once forked (that of the auricle pinnated), sori globose in two series nearer the margin than the costule and each opposite to a sinus of the lobules, rachis stramineous downy.—"*Colla, Pl. Chil. Fasc. ult. p. 48. Metten. Polyp. p. 64. P. procurrens, Kze. Annal. Pterid. p. 17.*"

Hab. Juan Fernandez, *Bertero, in Herb. Hook.* ("*P. tenellum, Bert. mst., not Forst.*").—A near ally of *P. tenellum*, but extremely different. Both are peculiar to the southern hemisphere.

125. *P. (Eupolypodium) macrodon*, Hook.; caudex 4 inches (and more?) long stout stramineous brown, fronds ample 14-19 inches long a foot and more broad broad-ovate

firm subcoriaceous-membranaceous glanduloso-pubescent on both sides, moderately acuminate pinnated to the very apex, ultimate pinnæ subcaudate pinnatifid at its base, the lateral pinnæ 6-8 inches long  $\frac{1}{2}$ - $\frac{3}{4}$  of an inch wide not diminishing at the base from a rather contracted obtusely cuneated sessile base elongato-oblong moderately but obtusely acuminate grossly dentato-serrate, serratures obtuse, costule prominent beneath stramineous, veins black when seen between the eye and the light, three or four times forked, sori large copious moderately distant forming two series intermediate between the costule and the margin, rachis rather stout brown.

Hab. Cobar, Vera Paz, Guatemala, *Salzm.*—This is among the largest of the *Eupolypodium*-group; certainly bearing the largest pinnæ, and is quite distinct from any other known to me.

126. *P. (Eupolypodium) sororium*, H. B. K.; caudex stout long repent paleaceous with ferruginous ovate sharply acuminate crisped scales, stipites distant stout a span to a foot long brown glabrous as is generally every part of the plant, frond 1-2 feet long 5-9 inches broad firm-membranaceous broad-ovate or ovato-oblong dark-green (when dry) pinnated pinnatifid towards the apex, pinnæ 4-6 inches long  $\frac{1}{2}$ -1 inch broad very patent distant from a narrow contracted but sessile base oblong-lanceolate acuminate entire or obscurely sinuato-subdenticulate, upper ones more or less decurrent at their bases, upper or confluent ones (segments) decurrent at their lower base with broad sinuses, terminal lobe generally caudato-elongate, costa prominent beneath, pale-brown, veins black slender three or four times forked, sori oval or oblong distant obliquely patent (not quite transverse) forming a series halfway between the costule and the margin.—*H. B. K. Nov. Gen. Am. i. p. 10. Willd. Sp. Pl. v. p. 191. Metten. Polyp. p. 62. P. dissimile, L. ?, and P. attenuatum, Willd. ?*

Hab. Tropical America: New Granada, *H. B. K., Moritz, n. 354*; Tarapota, Eastern Peru, *Spruce, n. 4652*; Andes of Ecuador, Montaña de Canelos, *Spruce, n. 5270*. West Indian Islands, frequent, *L. Guilding, Imray* (abnormal form, with some pinnæ deeply pinnatifid in the middle only, and there 2 inches wide). Cuba, *Linden, n. 1890, C. Wright, n. 805*.—This and *P. macrodon*, Hook. n. 125, are the largest of all the *Eupolypodium*-section. My numerous specimens all exhibit free venation; but Mettenius says of the veins, "hinc inde more *Margaritæ* anastomosantes," and hence he seems disposed to consider the *P. dissimile*, Schk. (an Linn.? *Goniophleb.*, Pr.), and *Goniophlebium elatum*, Fée, Gen. p. 256, the same.



127. *P. (Eupolypodium) subpetiolatum*, Hook.; caudex rather stout paleaceous with brown subulate scales, stipites distant 4 inches to a span long stramineous, fronds 1-1½ foot long ovato-lanceolate subcoriaceous-membranaceous pinnated pinnatifid only at the apex and ending in an elongated caudate lobe, pinnæ alternate remote rather distant 3-3½ inches long about ½ an inch wide lanceolate gradually but generally obtusely acuminate more or less serrulate, inferior ones obliquely truncate at the base and subpetiolate, the petiole winged above, superior ones obliquely cuneate subadnate, uppermost ones decurrent at the rather broad base and confluent, costæ pale downy beneath, veins approximate dark-coloured slender 2-4 times forked, sori copious subrotund fulvous in two series each rather nearer the costule than the margin, rachis testaceous stout.—*Hook. in Benth. Pl. Hartweg. p. 54, and in Ic. Pl. t. 291, 292. Metten. Polypod. p. 63. P. serratum, Mart. et Gal. Fil. Mex. p. 38. t. 9. f. 1 (according to Mettenius, in Herb. nostr., but the pinnæ are very unlike those of that figure; it is probably a variable species). Metten. Polyp. p. 62. P. Cubense, Fée, 6me Mém. p. 61. t. 26. f. 1.*

Hab. Mexico, *Hartweg, n. 414. Cordillera of Oaxaca, alt. 6500-7500 feet, Mart. et Galeotti. Guatemala, Skinner* (pinnæ entire or nearly so, and margined, 4 inches long; veins very rarely anastomosing). Cuba, *Linden (fide Metten.)*.

128. *P. (Eupolypodium) puberulum*, Schlecht.; “caudex creeping clothed with lanceolate acuminate ferruginous scales, stipes 4½ inches long, fronds membranaceous somewhat rigid pubescent on the costa and veins 1 foot long ovato-oblong acuminate pinnated, pinnæ 2 inches long 2-3½ lines wide from a broad base which is truncated above or truncato-auriculate, below exciso-auriculate lanceolate subfalcate gradually attenuated repand or irregularly crenato-sinuate, lowest ones scarcely abbreviated sessile free, the next upwards below free above adnate, uppermost ones on the frond broad-adnate, veins manifest, sori near the margin (often oval and oblique).” *Metten.—P. puberulum, Schlecht. in Linnæa, v. p. 607. Kze. in Linnæa, xviii. p. 330. Liebold, Fil. Mex. p. 50. Metten. Polypod. p. 63 (excl. syn.). P. Hartwegianum, Hook. Ic. Pl. t. 390. P. subpetiolatum, Eat. in Plant. Wright et Fendl. (not Hook.). P. biauriculatum, Hook. Ic. Pl. t. 121.*

Hab. Mexico, *Schiede et Deppe (Schlecht.). Oaxaca, Liebold (in Herb. nostr.).*

Venezuela, *Fendler*, n. 254. Chacapoyas, Peru, *Mathews*.—I have no authentic specimen from Schlechtendal of this plant; but I believe Liebold's specimens to be the same, as they certainly are the *P. puberulum* of Mettenius and Kunze, and I feel assured I am correct in referring hither the *P. subpetiolatum* (Eat. not Hook.) and my *P. bivauculatum*.

129. *P. (Eupolypodium) sublanosum*, Hook.; caudex?, stipites 4 inches long dirty stramineous sublanose as is the whole plant and beneath with whitish crisped hairs, fronds 12–14 inches long 3 inches wide firm but rather thin-membranaceous broad-lanceolate acuminate scarcely attenuated at the base pinnated below pinnatifid upwards, segments and pinnæ horizontal approximate from a broad-adnate base slightly decurrent below, above dilated so as to form an obtuse auricle oblong bluntly and very shortly acuminate quite entire, costæ straight stramineous, veins immersed indistinctly visible twice forked, sori subrotund rather distant in two series halfway between the costule and the margin, rachis firm stramineous.

Hab. Organ Mountains, Brazil, *Gardner*, n. 122.—Allied in size and general form to *P. puberulum*; but everywhere clothed with crisped hairs, giving the frond a somewhat hoary and woolly appearance: the veins are very inconspicuous, and the sori are quite different in form and position.

130. *P. (Eupolypodium) sericeo-lanatum*, Hook.; caudex creeping clothed with subulate brown woolly scales, stipites aggregated 1–2 inches long sericeo-villose, fronds 6–12–16 inches long  $1\frac{1}{2}$ –3 inches wide flaccid pendent firm-membranaceous clothed with silky whitish woolly hairs broad oblong-lanceolate or oblong-acuminate pinnate, pinnæ 1–2 inches long  $\frac{1}{4}$  of an inch broad oblong or linear-oblong alternate approximate from a rather broad base more or less decurrent below adnate more or less tapering to an obtuse point straight or falcately recurved rarely with a blunt auricle or lobe above and more rarely one below also, when the pinnæ become subhastate, quite entire, costæ slender straight appearing black when viewed between the eye and the light, veins short rather distant simple indistinct bearing the sorus at the apex in two series nearer the costule than the margin, sori globose, rachis filiform flexuose.

Hab. Ecuador, Pichincha, alt. 12,000 feet, and woods near Baños, *Jameson*, n. 235, 73, 29, and 394; mountains of Guayrapata, *Spruce*, n. 5277. New Granada, Ocaña, alt. 10,000–11,000 feet, *Schlim*, n. 313 (small, a span long, 1 inch broad, more densely silky with tawny hairs).—Evidently allied to the preceding, yet quite distinct and not far removed from *P. cultratum*. Some of the fronds resemble in outline those of *P. vulgare*; but they are truly pinnate, soft and flaccid, pendent, with extremely short, slender, silky stipites.

131. *P. (Eupolypodium) alternifolium*, Hook.; caudex?, stipites aggregated 1-1½ inch long slender clothed as is the whole plant with spreading soft silky hairs, fronds 2-3-10 feet (!) long lax and flaccid-membranaceous pendent linear shortly acuminate moderately attenuated at the base pinnated throughout in the most regularly alternate manner, pinnæ distant horizontal long ciliated one inch long almost exactly pyramidal that is from a broad adnate base ⅓ of an inch wide quite entire gradually tapering to a moderately acute point the sides uniform and equal or with the upper base only slightly rounded no way decurrent, pinnæ at the apex and base small triangular, costule very slender black when viewed between the eye and the light flexuose, veins quite slender black patent always simple bearing the globose sorus at the apex rather nearer the costule than the margin, rachis filiform flexuose. (TAB. CCLXXVII. A.)

Hab. Ecuador, occurring abundantly on the trunks and branches of trees, at elevations between 3000 and 10,000 feet, near Esmeraldas, and between Cuenca and Guayaquil, fronds very long, occasionally met with of the length of 10 feet, *Jameson, Hartweg, n. 1496*.—Remarkable as is this plant, and truly pinnate from the base to the summit of its long fronds, and peculiar as is the form of the pinnæ, I yet publish it with some doubt, and have, indeed, hesitated whether it should not be referred to *P. cultratum*; the more so as Mettenius has sent me a frond of *cultratum*, Metten. Polypod. p. 47 (= *P. suspensum* of his Fil. Lechlerianæ), possessing characters common to both; but the much larger size of our *P. alternifolium*, the pyramidal form of the equal-sided pinnæ, with their broad adnate bases, (distant from each other by the diameter of their base, together with their regular alternate insertion,) give the Fern a very peculiar appearance.

132. *P. (Eupolypodium) semiadnatum*, Hook.; caudex small short ferruginous villose, stipites 1-2-3 inches long filiform black and patenti-villous as is the rachis, fronds pendent coriaceous-membranaceous 10-16 inches long ½-1 inch wide linear-oblong acuminate attenuated below pinnated, pinnæ rather distant ovate or oblong-ovate obtuse or rarely acuminate villous beneath and ciliated with long hairs at the margin crenate or obtusely serrated the base contracted and above a little produced, costule slender and forked, veins moderately conspicuous, superior branch soriferous, sori four or five on each side the costule between it and the margin. —*Hook. Ic. Plant. t. 948 (or Cent. of Ferns, t. 48)*. *P. reclinatum*, *Brack. Fil. U. S. Expl. Exp. p. 46*.

Hab. On trunks of trees. Pilzhum, and near Pasto, Andes of Quito, *Jameson, n. 46, 77, and 498*. Organ Mountains, Brazil, on trees, *Gardner, n. 112*. Rio, *Brackenridge*.—The great peculiarity of this *Polypodium*, among the group to which it belongs, is the length of the very flaccid frond, and the numerous and

large pinnæ (sometimes more than  $\frac{1}{2}$  an inch long), and the contraction where they join on to the rachis, so that the point of attachment is comparatively small; and the margin is by no means decurrent; yet the pinnæ are in no way petiolate. It is allied, however, to some forms of *P. cultratum*.

133. *P. (Eupolypodium) venulosum*, Bl.; caudex short oblique or subrepent ferrugineo-squamoso stipites approximate somewhat tufted 1-3 inches long and as well as the purplish-black rachis and costa patently villose with long purplish hairs, fronds a span to  $1\frac{1}{2}$  foot long 1- $1\frac{1}{2}$  inch broad firm-membranaceous (young undeveloped ones clothed with dense purplish deciduous hairs) elongato-lanceolate acuminate much attenuated below (by the gradual dwarfing of the pinnæ) pinnate, pinnæ numerous approximate from a rather broad base linear-oblong entire obtuse, costule slender flexuose and as well as the rather distant obliquely erect simple veins very conspicuous, sori oval sunk in an oval cavity with a distinct raised margin in two rows parallel with the costa occupying the whole space between the costa and the margin.—*Bl. Fil. Jav. p. 180. t. 85. A. Metten. Polypod. p. 50. Ctenopteris, Kze. Bot. Zeit. iv. p. 425. Cryptosorus Dionæa and C. elasticus, Fée, Gen. p. 231. t. 19. C. f. 1, 2.—β, majus. P. Celebicum, Bl. Fil. Jav. p. 179. t. 84. B.*

Hab. Java, *Blume, Thos. Lobb, Zollinger*.—Well distinguished by its pinnated and not pinnatifid frond, and very patent-villous stipites, from *P. obliquatum*, Bl.; and by the submembranaceous fronds and conspicuous venation from *P. Celebicum*. In this, and all the *Cryptosorus*-group, probably, the receptacles of the sori, in age, fall away and leave oval apertures in the segments.

134. *P. (Eupolypodium) farinosum*, Hook.; caudex?, stipes slender filiform 1- $1\frac{1}{2}$  inch long black farinose, fronds submembranaceous 4-5 inches long  $1\frac{1}{2}$ -2 inches broad pendent? broad-elliptical-lanceolate moderately attenuated at both extremities white-pulverulent subfarinose on both sides pinnate below, the rest deeply almost to the rachis pinnatifid, pinnæ approximate subhorizontally patent 1- $1\frac{1}{2}$  inch long nearly  $\frac{1}{4}$  of an inch broad linear-oblong obtuse subexcised at the base below but a little decurrent auricled at the truncated base above, subsinuated otherwise entire, veins once forked clavate at the apex, upper branch soriferous, sori subrotund rather large golden-yellow forming a series halfway between the costa and the margin.—*Hook. Ic. Plant. t. 947 (or Cent. of Ferns, t. 47). Metten. Polyp. p. 59.*

Hab. Rare; trunk of an old tree on the eastern descent of the Cordillera of Quito, where the forests commence, *Jameson*.—A very remarkable species.

135. P.? (Eupolypodium) *Beckleri*, Hook.; caudex slender filiform a foot and more long much branched black villous rather than scaly, stipites numerous but remote  $\frac{1}{4}$ – $\frac{1}{2}$  an inch long and as well as the rachis slender filiform nigropubescent, fronds 2–2 $\frac{1}{2}$  inches long firm-membranaceous dark-green but subpellucid sparingly hirsute oblong attenuated below pinnated, terminal pinnæ quite free oblong-oval distinctly petiolate, lateral pinnæ 12–20 obliquely oblong obtuse subexcised at the inferior margin and entire superior margin unequally crenato-sublobate the base obliquely cuneate subpetiolate, superior base truncate scarcely subauriculate, lower pinnæ more distant smaller, costal vein slender flexuose, veinlets distant three or four on each side the costule distant simple or forked not reaching to the margin slightly thickened at the apex, sori?

Hab. River Mackay, Australia, *H. Beckler*, communicated by *Dr. Müller*.—This may possibly be an *Asplenium*, for I possess no sori; but whether *Asplenium* or *Polypodium*, I know of no species resembling it from Australia or any other country.

136. P. (Eupolypodium) *gracile*, Hook.; caudex short horizontal copiously rooting, stipites tufted 1–2 inches long wiry glabrous, fronds 6 inches to a span long  $\frac{1}{2}$ –1 inch broad coriaceous drooping glabrous lanceolate or linear-lanceolate moderately attenuated at both extremities pinnated, pinnæ distant oblong-lanceolate erecto-patent obtuse contracted at the base but not petiolate sinuato-pinnatifid with rounded lobes recurved when dry, rachis filiform blackish, costule very indistinct, veins immersed not visible, sori one to each lobule rather large nearer the margin than the costule.—*Hook. et Grev. Ic. Fil. t. 222. Metten. Polyp. p. 52.*

Hab. Hualhuay, near Pasco, Andes of Peru, *Cruckshanks*.—The figure of *Dr. Greville* in the 'Icones Filicum' is a good representation of the perfect state of the plant, but some of the fronds have much smaller and more erect pinnæ, with only one or two lobes on each side. I do not recognize a near affinity with any other described species, and I have never seen any other specimens than those from *Mr. Cruckshanks*.

137. P. (Eupolypodium) *athyrioides*, Hook.; stipites 2 inches (or more) long hispid-hirsute as well as the rachis, frond 10 inches to nearly a foot long 2 inches wide subcoriaceous dark-brown when dry, glabrous (except in the undeveloped portion) lanceolate acuminate attenuated at the base pinnated throughout, pinnæ numerous approximate from a broad quite sessile and adnate slightly auricled base

gradually lanceolate acuminate pinnatifid about halfway down with ovate obtuse lobes except at the apex which is entire, lowest pinnæ small triangular, veins internal simple terminating in a very conspicuous swollen clavate apex which bears the oval very prominent dull orange-coloured sori one to each lobe a little distant from the costule. (TAB. CCLXXVII. B.)

Hab. Pangoa, Peru, *Mathews*, n. 1103.—This pretty species has so much the habit of an asplenoid Fern, that on a hasty examination I had arranged it in that group in my herbarium; and the swollen apex of the veins, before the sori burst through, almost resembles the involucre of an *Athyrium*; but the sori are truly those of a *Polypodium*. I possess only two specimens, both destitute of caudex. The fronds appear as if they might be drooping in the living state.

138. *P. (Eupolypodium) longisetosum*, Hook.; caudex?, stipes 3 inches long slender flexuose deciduously villous, frond 8 inches long 2 inches wide membranaceous pendent very villous on both sides chiefly beneath and at the margin with long dark-brown spreading hairs, broad-lanceolate scarcely acuminate attenuated at the base with dwarfed distant pinnæ deeply pinnatifid above, the rest pinnate, segments or pinnæ 1 inch long 1 line wide horizontally patent linear-oblong obtuse decurrent at the base, lower ones more distant than the upper ones, all pinnatifid about halfway down to the costa with subtriangular obtuse lobes or teeth, rachis filiform and slender, costule black, veins simple short one to each lobe bearing a globose sorus nearer the rachis than the margin. (TAB. CCLXXVIII. A.)

Hab. Andes of Quito, *Jameson*, n. 79.—Though I possess only a solitary specimen of this pretty Fern, I am yet bound to consider it a new species, allied to *P. achilleæfolium* indeed, but differing in the larger size, the slenderer and flexuose rachis, the membranaceous and flaccid and pendent frond, incapable of supporting itself erect, the less deeply cut lobes of the pinnæ or segments, and, above all, the copious and very long hairs, which render the whole plant conspicuously villous.

139. *P. (Eupolypodium) achilleæfolium*, Klf.; “caudex (short) creeping clothed with membranaceous pale ferruginous lanceolate acuminate scales, stipites 4–8 lines long (clustered), fronds coriaceous on both sides as well as on the stipes setose with patent cinnamon-brown at length blackish hairs, 4–5 inches long lanceolate or oblong attenuated at both extremities deeply pinnatifid, segments with the superior base adnate, the inferior attenuate decurrent and forming a narrow wing, 10 lines long 1 line wide linear obtuse deeply serrato-pinnatifid narrower at each extremity, teeth or lobes

ovate obtuse, veins forked immersed one to each lobe, upper veinlet short bearing the sorus, sori large almost as broad as the segment, black hairs among the capsules." *Metten.*—*Klf. En. Fil.* p. 116. *Kze. in Schk. Fil.* p. 91. t. 43. f. 2. *Metten. Polyp.* p. 53. t. 1. f. 10 (*fragment with sori*). *P. piligerum*, *Hook. Ic. Pl.* v. 321.

Hab. Brazil, *Sellow*, *Gardner*.—On mossy stems of large trees, Organ Mountains). Pilzsum, Province of C..., Ecuador, *Jameson*.—Allied to *P. funiculum*, but habit and texture, etc., different.

140. *P. (Eupolypodium) bbianum*, *Hook.*; caudex short creeping clothed with subu. ferruginous crisped scales, stipites tufted short 1–2 lines long and as well as the rachis black and sparingly and deciduously villous, fronds 3–6 inches long 1 inch broad membranaceous but opaque glabrous subfalcate exactly lanceolate moderately attenuated at both extremities pinnated, pinnæ numerous approximate horizontally patent narrow-linear not half a line wide obtuse regularly sinuato-pinnatifid with numerous short rounded entire lobes, costule slender blackish, veins one to each lobe indistinct and each bearing a small globose sorus sunk in a cavity in the middle of the lobe, the cavity forming a protuberance on the upper side of the frond. (TAB. CCLXXVIII. B.)

Hab. Sarawak, Borneo, *Thos. Lobb*, on trees, alt. 2500 feet.—One of the prettiest and most delicate of the *Eupolypodium*-group.

141. *P. (Eupolypodium) funiculum*, *Fée*; caudex small oblique clothed with ferruginous scales copiously sarmentose increasing as it were by adventitious fibre-like runners  $1\frac{1}{2}$  foot and more long often parallel with each other and entangled, stipites 1–3 inches long glabrous aggregated, fronds 3–5 inches long  $1\frac{1}{2}$ –2 inches wide dark-green firm-membranaceous broad- or ovato-lanceolate caudate rather than acuminate glabrous scarcely attenuated at the base pinnate, the pinnæ linear  $\frac{1}{2}$ –1 inch long from a rather broad and slightly decurrent base linear subacuminate quite straight pinnatifido-serrate, lowest ones dwarfed, rachis slightly hairy and costule black, veins one to each tooth bearing each a small yellowish sorus of few capsules.—*Fée, Gen. Fil.* p. 241. *6me Mém.* p. 12. t. 8. f. 2. *Metten. Polyp.* p. 52.

Hab. Cuba, *Linden*, n. 1885, *C. Wright*, n. 807.—A very peculiar species, and very distinct. *Fée*'s figure well represents all the characteristic features of the plant.

\*\*\*\*\* *Fronds bipinnate, or bipinnatifid, or decomposed.* 142-151.

142. *P. (Eupolypodium) tenuisectum*, Bl.; caudex ("creeping somewhat woody," Bl.), stipites 3-4-5 inches long subaggregated shaggy with copious long patent ferruginous hairs partially continued up the rachis, fronds a span to a foot long 2-2½ inches broad rigid-subcoriaceous sparsely black-setose broad-lanceolate acuminate moderately attenuated at the base bipinnate (or bipinnatifid), primary pinnae 1-2 inches long rather distant linear-lanceolate acuminate patent, upper ones especially long-decurrent so as to be coadunate, lower ones distinct, pinnules 1-1½ line long very narrow-linear, all of them decurrent so as to form a winged margin to the costa, veins solitary in each pinnule little more than half its length, sori solitary much below the clavate apex of the veins and near the costule large globose.—*Bl. Fil. Jav. p. 189. t. 88. A. Metten. Fil. Lechl. p. 5. t. 2. f. 1-3. Hook. 2d Cent. of Ferns, t. 21. P. myriophyllum, Metten. Fil. Lechl. p. 6 (not Bl.).*

Hab. Java, lofty mountains, on trees, *Blume, Zollinger, Thos. Lobb.* Trunks of trees, near Talanaca, Peru, *Lechler*.—A beautiful and apparently rare species, yet inhabiting lofty mountains both in Java and in tropical America. Mettenius appears to be in doubt whether this should be considered a *Polypodium*, in his view of the genus, or *Phegopteris*, Pr., which he sanctions as a genus.

143. *P. (Eupolypodium) millefolium*, Bl.; "caudex creeping, stipes 1-3 lines long villous with patent ferruginous hairs, fronds rigid-membranaceous 8 inches long sparingly setose on the costae lanceolate acuminate bi- or tripinnatifid, the primary segments 9 lines long attenuated at the adnate base ovate or ovato-lanceolate diminishing at each end, secondary ones 3-4 lines long, and the tertiary ones confluent with a narrow wing, lowest ones decurrent on the stipes from a cuneately attenuated base linear-oblong or spatulate entire serrated or pinnatifid, veins of *Cænopteris* ending in an incrassated apex at the middle of the segments, primary superior segments fertile deeply pinnatifid, the segments narrow ovato-oblong rather acute, vein forked monosorous at the apex of a superior abbreviated branch." *Metten.—Bl. Fil. Jav. p. 190. t. 78. A. Metten. Polypod. p. 54. t. 1. f. 7-9.*

Hab. Java, "*Blume, Zollinger, n. 1723.*"—I have never seen this species, which appears very distinct from *P. tenuisectum*, but with which Mettenius seems at one time to have confounded it.



(Sori solitary, on a costal vein below the apex of a segment. Fronds small, substrigose, with appressed, small, scattered, clavate, red, pellucid glands.—*Adenophorus*, *Gaud.* 144-146.)

144. *P. (Eupolypodium) hymenophylloides*, Kaulf.; caudex small fibroso-cæspitose, stipites tufted slender 2-5 lines long, frond 2-3 inches long oblong or linear-oblong obtuse submembranaceous glandular pinnate, pinnæ  $\frac{1}{2}$  inch long oblong pinnatifid nearly to the rachis with 3-9 obovate very obtuse segments.—*Klfs. En. Fil. p.* 118. *Metten. Polyp. p.* 31. *Adenophorus*, *Hook. et Grev. Ic. Fil. t.* 176. *Aden. minutus*, *Gaud. in Freyc. Voy. Bot. i. p.* 365. *t. 8. f. 3.* *Amphoradenium*, *Desv.*

Hab. Sandwich Islands, *Chamisso*. Oahu, *Beechey, Diell*. Sumatra, *Teschemacher, in Herb. nostr.*—Much more lax in habit than the two following species, and extremely different from them.

145. *P. (Eupolypodium) tamariscinum*, Klfs.; caudex long creeping, stipites rather slender 2-4 inches long distant, fronds broad- or ovato-lanceolate 3-4 inches to a span long quite opaque pinnate glandulose, pinnæ 1-2 $\frac{1}{2}$  inches long deeply pinnatifid or bipinnatifid with narrow-linear acute or linear-spathulate and obtuse segments.—*a.* primary pinnæ pinnatifid, the segments spathulate. *P. tamariscinum*, *Klfs. En. Fil. p.* 117. *Adenophorus Tamarisci*, *Hook. et Grev. Ic. Fil. t.* 175. *A. bipinnatus*, *Gaudich. in Freyc. Voy. Bot. p.* 365. *t. 8. f. 2.* *Hook. et Grev. Ic. Fil. t.* 174. *Fée, Gen. Fil. p.* 99. *t. 10. A.* *Amphoradenium australe*, *Desv.*—*β.* primary pinnæ bipinnatifid, the segments generally acute. *Adenophorus tripinnatifidus*, *Gaud. in Freyc. Voy. Bot. p.* 365. *t. 8. f. 1.* *Polypodium*, *Pr. Metten. Polyp. p.* 32. *Amphoradenium Gaudichaudii*, *Desv.*

Hab. Otaheite, *Menzies*. Sandwich Islands, *Chamisso, Gaudichaud, Diell, Macrae, Douglas, Hillebrand*. Java, *Thos. Lobb*. Sumatra, *Teschemacher*.—This is a very much larger and stouter growing plant than *P. hymenophylloides*, and has a long creeping caudex as thick as a crow's quill. It is variable in its ramification, and my numerous specimens satisfy me that the above names are all referable to one species.

146. *P. (Eupolypodium) Hillebrandii*, Hook.; caudex thick as a pigeon's quill creeping paleaceous with brown glossy scales, stipes 4-6 inches long rather stout, fronds 6-9 inches high 2-4 inches broad oblong-ovate submembranaceous subpellucid very minutely glandulose bipinnatifid or only at the base pinnate (or wholly pinnate with most of the pinnæ united by a broad wing on the rachis), pinnæ or pri-

mary segments patent  $1\frac{1}{2}$ –2 inches long more than  $\frac{1}{4}$  of an inch broad lanceolate gradually but obtusely acuminate deeply pinnatifid, the segments lanceolate acute erecto-patent entire or subpinnatifidly and acutely serrate, lowest superior segment the largest and often again pinnatifid, costa black, veins one to each segment very distinct reaching nearly to the apex and bearing the sorus below the extremity (hence a *Phegopteris*), sorus small in proportion to the breadth of the segment. (TAB. CCLXXIX. A.)

Hab. Honolulu, Sandwich Islands, *Dr. Hillebrand*.—Extremely different from *P. tamariscinum* in texture, and in the pellucid nature of the frond, and the shape of the segments. The specimens are very uniform.

147. *P. (Eupolypodium) heteromorphum*, Hook. et Grev. ; caudex small short erect very villous, stipites tufted slender filiform very variable in length villous as is the whole plant with copious long ferruginous simple or stellated hairs sometimes quite shaggy, fronds membranaceous simple or several times dichotomously forked from 4–6 inches to a foot and more in length sometimes regularly bipinnate and then they are 4–5 inches in diameter, branches whether forked or bipinnate are  $\frac{1}{2}$ – $\frac{3}{4}$  inch in diameter pinnated with rather distant pinnæ from 2–3 lines to  $\frac{1}{2}$  an inch long distant sessile and decurrent or subpetiolate generally obovato-spathulate and entire or oblong obtuse and more or less pinnatifid, costule and rather distant simple veins manifest, sori 1–6 on a pinnule subglobose terminal on the veins and nearer the margin than to the costule. *Hook. et Grev. Ic. Fil. t. 108. Metten. Polyp. p. 48.*

Hab. Andes of Ecuador, alt. 12,000–15,000 feet, growing in large patches over the face of the dripping rocks, *Jameson*. New Granada, *Linden, n. 75, Purdie, Hartweg, n. 1517*. Mexico, *Schiede, Andrieux, n. 46, Liebmann, Linden, n. 51, Galeotti, n. 6, 261*.—I must refer to Dr. Greville's admirable figure of this Fern, in *Ic. Fil.*, for some of the variations of this most singular and heteromorphous species.

148. *P. (Eupolypodium) eriophorum*, Hook. ; caudex as thick as a crow's quill repent densely clothed with setaceous castaneous scales, stipites numerous approximate 4–5 inches long black patently villous, fronds 2–2 $\frac{1}{2}$  inches long cordately five-angled deeply three-lobed obtuse bi-tripinnatifid densely villosa-tomentose tawny beneath, middle lobe triangular pinnatifid, the segments oblong obtuse entire or lobulate, lateral lobes semiovate lower half pinnatifid, veinlets forked, sori marginal on the apex of the veinlets. *Hook. Ic. Pl. t. 991.*

*Nothochlæna eriophora*, *Fée, Gen. Fil. p. 159. t. 13. f. 3.*  
*Cheilanthes*, *Metten. Chelanth. p. 24.* *Nothochlæna pinnatifida*, *Kze. in Schk. Fil. Suppl. i. p. 148.*

Hab. Shady clefts on the hills near the city of Oeira, Brazil, *Gardner, n. 2390.*  
 —A very peculiar and well-marked Fern, found by no one, that we know of, except Mr. Gardner, in the locality above mentioned.

149. *P. (Eupolypodium) grammitidis*, Br.; caudex small suberect clothed with pale-brown scales, stipites aggregated 1–2 inches long glabrous as in the whole plant, fronds 3–6–8 inches long coriaceous 1–2 inches broad pale brownish-green (as well as the stipes) when dry lanceolate or broad-lanceolate acuminate sometimes caudate attenuated below and decurrent upon the stipes deeply almost to the rachis pinnate, the upper half more or less bipinnatifid, segments often very unequal in length linear entire  $1\frac{1}{2}$  line wide, lower ones obtuse entire, superior ones generally pinnatifid with unequal subtriangular or oblong lobes or teeth, all of them decurrent distant often an inch apart, costule and veins immersed, the latter simple or forked, sori oblique at the base of each tooth oval rarely subrotund, when quite young oblong.—*Br. Prodr. Fl. Nov. Holl. p. 3. All. Cunn. Fl. Nov. Zeal. p. 363. Hook. Fl. Ant-arct. p. 111. Fl. Nov. Zeal. ii. p. 41. Metten. Polyp. p. 53. Grammitis heterophylla, Labill. Fl. Nov. Holl. ii. p. 91. t. 239. Xyphopteris, Spr. Polyp. Billardieri, Fée, Gen. Fil. p. 236.*

Hab. On trees, Tasmania, *Labillardière, and others.* New Zealand, *Menzies, All. Cunningham, etc.*; Northern Island, to the extreme south, and in Lord Auckland and Campbell's Islands, *J. D. Hooker.*—The figure of *Labillardière* scarcely represents the fronds so truly bipinnatifid as they generally are. It is remarkable that this species has not yet been detected in Australia proper.

150. *P. (Eupolypodium) pilipes*, Hook.; caudex indistinct apparently rather stout erect or ascending densely clothed with the numerous crowded subflexuose stipites 3–4 inches long below densely villous with copious patent bright ferruginous hairs, fronds subcoriaceous glabrous or glanduloso-pubescent 4 inches to nearly a foot long 2–4 inches wide pendulous broad-lanceolate or ovate moderately acuminate with the base attenuated deeply and almost to the rachis pinnatifid or equally deeply bipinnatifid, the segments numerous often crowded linear-elongated varying much from 1–3 inches long and very irregular subfalcate acuminate shortly lobato-pinnatifid, costule and veinlets sunk in the substance of the segments, veins simple erecto-patent one to each

small lobe terminated by an oval or subglobose sorus occupying the lobule.—*Hook. Ic. Pl. t. 221. Metten. Polypod. p. 51, according to the reference to Hook. Ic. Pl.; but not according to the localities given.*

Hab. Chacapoyas, Province of Myobamba, eastern declivity of the Andes of Peru, *Mathews*.—I have never seen any specimens of this most distinct species of *Polypodium*, except Mr. Mathews's Peruvian ones; and all that I have seen from Jamaica, Merida, etc., and from Lechler (Peru), under this name, are another species. (See our next number.) My figure above quoted will show it to be quite unique of its kind.

151. *P. (Eupolypodium) decipiens*, Hook.; caudex a horizontal or ascendent copiously rooting rhizome on the apex of which the copious slender subferruginously pilose flexile stipites 1–1½ inch long are aggregated, fronds 4 inches to a foot long 1½–2 inches wide flaccid drooping firm-membranaceous slightly glanduloso-pubescent oblong-lanceolate acuminate pinnatifid nearly to the rachis or often quite so and then pinnate, segments or pinnae varying in length 1–2 inches long 1 line wide here and there one appears among the rest 1½ and even 3–4 inches long which is itself in the same manner as the frond pinnatifid, all the segments linear acuminate distant coarsely serrato- or lobato-pinnatifid the base broader and decurrent, costule as well as the rachis generally black, veins simple one to each lobe or serrature and occupied by a small oval sorus scarcely sunk in a cavity. (TAB. CCLXXIX. B.)—*P. pilipes*, *Kl. in Linnaea*, xx. p. 382, and *Metten. Polyp. p. 51 (not Hook.)*. *Fil. Lechl. Peruv. p. 7.*

Hab. Jamaica, *Macfadyen*, *Wiles*. Columbia, *Moritz*, n. 337. Forest of Archedona, Ecuador, *Jameson*. Trunks of trees, Sachapata, Peru, *Lechler*, n. 2714.—Although certainly an allied species to my *P. pilipes*, this is, in reality, extremely different, as may at once be seen by the figures respectively quoted. My figure and description of the latter have been quite misunderstood by Klotzsch and Mettenius.

§§ PHEGopteris.—Same characters as *Eupolypodium*, but the fronds are rarely simple, frequently pinnate, generally variously compound. Stipes not articulated upon the caudex.—This group of *Eupolypodium* is merely retained out of respect to those able botanists who consider its character sufficient to establish a genus. Neither habit nor assigned characters appear to me to warrant the distinction. It corresponds with *Lastrea* among involucrate Ferns, and where the involucre is fallen off the latter it is impossible to distinguish the two generically.

\* Fronds simple, pinnatifid, rarely subpinnate at the base. 152.

152. *P. (Phegopteris) decursivo-pinnatum*, Van Hall; caudex oblique stout, stipites tufted 4–6 inches long and as well

as the rachis stramineous paleaceous with subulate ciliated ferruginous scales, fronds firm-membranaceous villososquamose 1-1½ foot long 2-3½ inches broad lanceolate acuminate attenuate and subpinnate below, the rest deeply pinnatifid nearly to the rachis, segments patent approximate and with a very narrow and acute sinus or wider apart and broad sinuses with 1-2 short triangular confluent lobes in these sinuses, from a dilated base oblong-acuminate, those closely placed are entire or crenato-lobulate, the distant ones pinnatifid with ovate or rounded lobes, the axillary lobes (those in the sinuses) entire often fertile, veins pinnated, sori dorsal upon the veinlets small, capsules few mixed with long hairs.—*Hook. 2d Cent. of Ferns, t. 49. Phegopteris, Fée, Gen. Fil. p. 242. t. 20. A (fragment only). Aspidium, Kze. Metten. Aspid. p. 75. Lastrea decurrens, J. Sm.*

Hab. Japan, *Goring*. Port Chusan, Korea, *Wilford*. Ningpo, *Oldham*. Sz'chuan, Yang-tse Kiang River, extreme west of China, *Col. Saul*. Formosa, *Wilford*.—A very peculiar and distinct species. Most of the specimens from Formosa are simply pinnatifid, with close-placed segments, and no intermediate lobes; yet they are mature and copiously soriferous: others of them exhibit a passage to what may be considered the normal form. Kunze and others consider the small tuft of hairs in the sori to arise from a small scale or imperfect involucre.

\*\* *Fronds pinnate. Pinnæ entire or toothed, rarely pinnatifid.* 153-157.

153. *P. (Phegopteris) hastæfolium*, Sw.; caudex short erect or ascending scaly, stipites tufted short 1-2 inches long partially scaly, fronds 6-10 inches long 1-2 inches broad lanceolate acuminate much attenuated below firm subcoriaceo-membranaceous opaque pinnate often for their whole length, generally pinnatifid at the apex and sometimes the rachis runs out into long nearly naked decurved and rooting apex, pinnæ subpetiolate horizontal ½-1 inch long hastate (the margin entire), uppermost oblong sessile without basal lobes and at the apex confluent, lowermost dwarfed ones reflexed, veins simple or forked quite free in the upper half bearing each a dorsal sorus between the costa and the margin.—*Sw. Syn. Fil. p. 36. Fl. Ind. Occ. iii. p. 1653. Syn. Fil. p. 36. Hook. et Grev. Ic. Fil. t. 203. P. sagittatum, Sw. Prodr. Phegopteris, J. Sm. Aspidium reptans, var. 2, hastæfolia, Metten. Aspid. p. 99. t. 2. f. 5 (a minute scale-like involucre only). Eat. in Fil. Wright et Fendl. p. 211.*

Hab. West Indies: Jamaica, *Swartz, Macfadyen, Wilson*. Cuba, *C. Wright, n. 812*.—The involucre, such as Mettenius describes and represents, is a most minute fringed scale, a mere apology for an indusium. To me, this appears a very

distinct species from *P. (Goniopteris) reptans*, with which Mettenius unites it, in the different texture of the frond and shape of the pinnæ, and in the absence of anastomosing veins.

154. *P. (Phegopteris) cordatum*, Hook.; caudex short erect thick, stipites tufted  $\frac{1}{2}$ –1 inch long slender filiform scaleless stramineous and pubescent as well as the slender rachis, fronds 3–4 inches long 1 inch wide firm-membranaceous pilosulous subpellucid lanceolate obtusely acuminate attenuated at the base pinnated scarcely pinnatifid at the extremity, pinnæ on a very short but distinct petiole oblong very obtuse cordate at the base scarcely  $\frac{1}{2}$  an inch long entire at the margin rarely with an obscure tooth or auricle at the superior base, veins simple rarely forked all free and each bearing one sorus near the middle between the costule and the margin.—*Phegopteris*, Fée, 6me Mém. Foug. Nouv. p. 13. t. 6. f. 3. *Aspidium reptans*, var. 1, cordata, Metten. *Aspid.* p. 99. *Eat. in Fil. Wright. et Fendl. p.* 211.

Hab. Cuba, Linden, n. 1873, C. Wright, n. 1014.—Fée's figure is very accurate. This has the same venation as *P. hastatum*, our last species, and it may possibly be a form of that; but it cannot belong to *P. (Goniopteris) reptans*, if there is any confidence to be placed in venation.

155. *P. (Phegopteris) Sancti-Gabrielii*, Hook.; caudex?, stipes  $1\frac{1}{2}$  foot long and more stout pale-brown glossy moderately paleaceous at the base with lanceolate acuminate dark-brown scales, fronds oblong-ovate acuminate 2 feet long 10 inches broad truncated at the base coriaceous-membranaceous dark-green above paler beneath quite glabrous pinnated pinnatifid at the extremity by the union of the bases of the pinnæ, pinnæ numerous rather distant 5–6 inches long  $\frac{1}{2}$ – $\frac{3}{4}$  of an inch broad all petiolate horizontally patent from a subcuneato-truncated base with a distinct sharp auricle above elongato-oblong gradually acuminate the margin coarsely crenato-serrate, the serratures sharp towards the extremity, veins copious approximate pinnate subfascicled, veinlets 5–6 most of the inferior ones bearing a dorsal sorus which thus form 3–4 regular lines or series between the costa and the margin, rachis glossy pale reddish-brown scaleless.

Hab. San Gabriel, Valley of the Amazon, Spruce, n. 2153.—Habit and dark colour of our Peruvian *Lastrea macrotis* (p. 86, tab. CCXLII. B), but glabrous, with only a small auricle, and no refracted lower pinnæ; nor are the pinnæ more than crenato-serrate, not at all pinnatifid.

156. *P. (Phegopteris) Walkeræ*, Hook.; caudex?, stipes 12–14 inches long stout testaceous brown at the very base

densely squarrose with large ovate acuminate pale-brown glossy scales mixed with very slender linear-setaceous ones which latter continue up the stipes and the rachis, fronds  $2\frac{1}{2}$  and more feet long 6-8 inches and more wide firm coriaceous (dark-brown when dry) paler beneath oblong-lanceolate pinnated throughout or gradually shorter coadunate and pinnatifid only at the very apex, pinnæ suberecto-patent 5-6 inches long  $\frac{1}{2}$  an inch to 1 inch and more broad long-petiolate especially the lower ones lanceolate obliquely cuneate at the base the margin more or less (but never deeply) lobato-pinnatifid rarely subfalcate, lobes (the largest of them) ovate acute, veins copious approximate fasciculato-pinnate, sori dorsal upon the veinlets rather sparse forming two or more rarely three lines or series between the costa and the margin, (scales or paleaceous hairs on the rachis and even stipes very deciduous).

Hab. Ceylon, Adam's Peak, alt. 6000 feet, Mrs. Genl. Walker, Gardner, n. 1256, Thwaites, n. 3276.—A noble and most distinct species, with the texture and venation of *Polystichum*. I have reason for believing that the species is peculiar to Adam's Peak, and from nearly its highest point.

157. P. (Phegopteris) *elongatum*, Wall.; caudex?, stipes 1-1 $\frac{1}{2}$  foot and more long stout tawny-brown very paleaceous below with dark castaneous glossy falcato-subulate long-acuminate scales, fronds ample 2 feet and more long 6-10 inches and more broad thin firm-coriaceous ovato-oblong acuminate pinnated to the very apex, pinnæ numerous more or less patent and distant 5-10 inches long  $\frac{1}{2}$  an inch broad subpetiolate from an obliquely cuneate but not dilated (rarely subauricled) base linear or elongato-oblong finely acuminate the margin pinnatifid subduplicato-serrated, serratures subspinose, terminal pinna like the rest but more petiolate, veins copious fasciculato-pinnate, veinlets each of them bearing a dorsal sorus and thus copious and irregularly scattered over the back of the frond or in irregular series.—Wall. Cat. n. 309. *Aspidium cuspidatum*, Metten. *Aspid.* p. 92.

Hab. Nepal, Wallich. Khasya, Hooker fl. et Thomson. Ceylon, Gardner, n. 1256.—Mettenius places this in *Aspidium*, but he puts a mark of interrogation to the word (indusium?). On my numerous specimens I am not able to trace the presence of an involucre.

\*\*\* Fronds pinnate. Pinnæ usually deeply pinnatifid, rarely less than halfway down to the costa. 158-176.

158. P. (Phegopteris) *Dianæ*, Hook.; caudex stout short

erect or ascending coarsely scaly, stipites a span to 14 inches long stout brown quite squarrose with large broad-ovate acuminate opaque downy scales mixed with smaller scales and with down which are continued up the rachis, fronds ample  $1\frac{1}{2}$  foot and more long nearly a foot wide firm-membranaceous broad-ovate acuminate glabrous above very downy and almost woolly beneath pinnated pinnatifid at the apex, pinnæ 6-8 inches long 1-2 inches broad horizontally patent sometimes quite opposite often subfalcate, the lowest more or less deflexed subpetiolate from a rather broad truncated base parallel with the rachis oblong gradually and rather finely acuminate deeply beyond the middle towards the costa pinnatifid, segments large  $\frac{1}{2}$ -1 inch long ovate or oblong more or less obtuse entire or serrated, veins approximate once or twice forked, sori dorsal sometimes forming an intermediate line or series between the costule and the margin sometimes rather irregularly scattered, costæ beneath very woolly and more or less scaly.

Hab. St. Helena, *Cuming*, n. 423, on Diana's Peak, *J. D. Hooker*, in dense woods, where it grows 3-5 feet high.—A fine and well-marked species, which does not appear to have been taken up by any author.

159. *P. (Phegopteris) Sieberianum*, Klfs.; caudex?, petiole 10-18 inches long stout dark-brown at the base, the rest and the rachis stramineous glossy, frond ample  $1\frac{1}{2}$ -2 feet long nearly a foot wide firm subcoriaceous-membranaceous broad-ovate or cordate acuminate glabrous pinnate, pinnæ 8-10 pairs mostly opposite horizontally patent 5-6 inches long 1-2 inches broad falcate curved upwards, lowest pair deflexed unequal sided (inferior half the broadest) and deflexed all of them from a dilated base somewhat overlapping the rachis broad-oblong acuminate pinnatifid halfway or more down to the costa with oblong subfalcate acute entire lobes, terminal pinna very large long-petioled ovate acuminate and pinnatifid, costule pinnated with 12-14 simple or forked approximate veins of which the lower opposite ones nearly meet at the sinus not unfrequently anastomosing, sori small dorsal sometimes arranged in a regular series between the costule sometimes scattered.—*Klfs. En. in Spreng. Syst. Nat.* iv. p. 56. *Phegopteris*, *Fée, Gen. p.* 243. *Metten. Phegopt. p.* 21.

Hab. Mauritius, *Sieber, Syn. Fil. n.* 37, *Carmichael, Bouton, Admiral Sir F. Grey*.—A noble species, allied in general habit and venation to the South American *Phegopteris brachyodus* of *Mettenius*, which I have referred to *Eumephro-*



*dium* (see p. 83 of this volume). Here the venation is very variable; in the young frond, of which the pinnæ are imperfectly or not at all pinnatifid, the veins are fasciculato-pinnate, in the perfect lobes they are regularly pinnate, spreading, and forming side-ribs, as it were, to the costule, generally quite free; but in several specimens they anastomose irregularly, besides almost uniting at the sinuses.

160. *P. (Phegopteris) erubescens*, Wall.; caudex ?, stipites 1-2 feet and more long stout and as well as the rachis and costa more or less purplish-tawny, fronds in general ample but varying from 1-3-4 feet in length and from 6 inches to more than 2 feet in breadth firm subcoriaceous broad-ovate acuminate pinnated to the extremity, pinnæ 3-16 inches long  $\frac{1}{2}$ -1 $\frac{1}{2}$  inch wide approximate sessile elongato-oblong the sides parallel for a long way and then gradually acuminate to a serrated apex deeply nearly to the costa pinnatifid, segments oblong subfalcate rather acute entire or obscurely serrated, veins approximate simple free, two lowermost opposite pair meeting but scarcely uniting at the sinus soriferous always at the very base so as to form two lines or series (at length confluent) one on each side and close to the costa not extending to the apex of the segment, main rachis stout with a broad groove on the upper side (when dry).—*P. erubescens*, Wall. Cat. n. 330.

Hab. Kamoun, Wallich, and found in all Northern India, through Himalaya, from west to east, Sikkim, etc., Strachey and Winterbottom (alt. 2000 feet), Edgworth, Col. Bates, Thomson, small specimen villous beneath on the rachis and costæ, with long white very soft hairs. Khasya, Hooker fil. et Thomson, Griffith. Malacca, Griffith (my largest specimen, with pinnæ 1 foot 4 inches long).—All my numerous specimens have the sori close to the costule, giving a blechnoid character to the plant.

From Amboyna (Herb. Webb), and from Ceram (De Vriese, n. 469), I possess a *Polypodium* only different from this in having the sori distant from the costule, and the lowest pinnæ tapering into a long petiole.

161. *P. (Phegopteris) Griffithii*, Hook.; caudex ?, stipes 1-1 $\frac{1}{2}$  foot long rather slender slightly scaly at the very base and as well as the rachis deep glossy chestnut-brown, fronds firm subcoriaceo-membranaceous 1 $\frac{1}{2}$ -2 $\frac{1}{2}$  feet long 6-8 inches broad oblong-lanceolate acuminate attenuate at the base pinnated pinnatifid only at the apex, pinnæ distant especially the lower dwarfed ones 3-4 $\frac{1}{2}$  inches long  $\frac{1}{2}$ - $\frac{3}{4}$  of an inch wide from a broad sessile base oblong gradually acuminate into an entire apex, the rest pinnatifid halfway and more down to the rachis, segments spreading oblong obtuse quite entire, lowest pair of segments generally the longest and overlapping the rachis, veins about five pairs to each costule

rather distant simple rarely forked soriferous near the middle, sori rather large nearer the margin than the costule, rachis and costules and veins beneath more or less pubescently villous.

Hab. India: Assam, Khasya (*Thos. Lobb*), and Mishmee, *Griffith*; Sikkim-Himalaya, *Hooker fil. et Thomson*.—This has few tangible characters of which to constitute a species; in general habit, especially in the usually elongated lowest pair of segments of the pinna, it resembles *Gymnogramme aurita*, but it is by no means so robust a plant. The numerous specimens in Dr. Hooker's Indian collection all bear the name of *P. brunnæum*, Wall. (*P. paludosum*, Bl., of this work); but that is clearly a bipinnate species, with elongated segments, and pinnules quite pinnatifid at the margin. It is the upper and younger pinnae of the frond that have the greatest resemblance to the same in our plant; but I am far from asserting this may not prove a form of that species.

162. *P. (Phegopteris) obscurum*, Hook.; caudex?, stipes (a portion only) 2–3 inches long and as well as the rachis intensely ebeneous-black polished glandularly pubescent, fronds 1–1½ foot long 6–10 inches broad submembranaceous ovate acuminate pinnate pinnatifid at the apex, pinnæ rather wide apart horizontally patent 4–5 inches long  $\frac{3}{4}$  (in the fertile frond) –1 inch (in the sterile) broad oblong-lanceolate acuminate somewhat contracted in the lower half of the sterile frond uniformly and deeply pinnatifid to near the rachis in the fertile frond, less deeply above the middle in the sterile one where the pinna is broadest, segments oblong obtuse scarcely falcate entire or subserrate, the sinuses obtuse, veins free in my specimens simple or forked, sori copious dorsal or sometimes terminal in two series intermediate between the costule and the margin, costæ and costules villous very slender in the sterile plant stouter in the fertile the former black at the base beneath.—*Phegopteris obscura*, Fée, *Gen. Fil. (name only)*. *Stenosemia aurita*, J. Sm. in *Hook. Gen. Fil. t. 94. ff. 5 and 6 (only, and as regards Cuming's plant, n. 302)*. *Phegopteris Philippinensis*, 2d var., *Metten. Phegopt. p. 27*.

Hab. Leyti, Philippine Islands, *Cuming, n. 302*. *Tavoy, C. S. P. Parish, n. 51* (fertile fronds only).—A peculiar-looking plant, confounded with *Phegopteris Philippinensis* by Mettenius (*Stenosemia aurita*, Pr., J. Sm., *Gymnogramme Philippinensis*, Fée, *Gen. Fil. p. 181*).

163. *P. (Phegopteris) auriculatum*, Wall.; caudex?, stipes stout 1½ foot or more long dirty stramineous the upper part auricled as it were by the dwarfed inferior pinnæ and as well as the rachis densely villous with yellowish spreading hairs, fronds ample subcoriaceous 3 feet and more long 12–14

inches wide oblong broad-lanceolate acuminate singularly and suddenly attenuated below by the numerous dwarfed ear-like pinnæ, pinnated, pinnæ approximate above distant below 4-7 inches long  $\frac{3}{4}$ -1 inch broad sessile oblong suddenly short-acuminate at the apex deeply almost to the rachis pinnatifid truncate at the base, segments horizontal broad-oblong very obtuse entire subfalcate, sinuses acute, veins approximate mostly simple all free, but the lowest opposite pair uniting with a pellucid cartilaginous line at the sinus soriferous in the middle between the costule and the margin, costæ and costules and sometimes the segments more or less hirsute.—*Wall. Cat. n. 314.*—Var.  $\beta$ , *subglabrum*; segments narrower, stipites and rachis subglabrous and of a reddish hue.

Hab. Nepal, *Wallich, n. 314.* Simla, *Edgeworth.* Sikkim-Himalaya, *Hooker fil. et Thomson, n. 20/b.*—Var.  $\beta$ . Assam and Khasya, *Griffith.*—This belongs to a puzzling group of Ferns of India allied to *P. erubescens* of Wallich. The *P. auriculatum* of Wallich has long been distributed by that generous botanist, but I do not find it anywhere noticed. The species is best distinguished by the many dwarfed and distant pinnæ, resembling auricles, on the upper part of the stipes, and in the normal state is very villous on the stipes and rachis and on the costæ and costules beneath, and more or less on the frond itself. The var.  $\beta$ , however, here noticed, shows a near affinity with *P. erubescens*; but there the sori are costulate, here at a distance between the margin and the costule. I possess specimens quite according with these, but wanting the dwarfed lower pinnæ.

164. *P. (Phegopteris) rotundatum*, Hook.; caudex?, stipes  $1\frac{1}{2}$  foot long stout dirty-brown scaly below with very long linear-subulate dark-brown scales (upwards becoming hairy) which are continued up the rachis and on the costæ costule etc., frond 2-2 $\frac{1}{2}$  feet long nearly a foot broad firm subcoriaceous-membranaceous opaque brownish-green pellucido-punctate with very copious yellowish crowded dots broad-ovato-lanceolate acuminate pinnate pinnatifid towards the apex, lowest pinnæ petioled, the rest sessile 4-6 inches long  $\frac{1}{2}$ -1 inch wide oblong truncated at the base acuminate at the apex with a long entire point deeply pinnatifid almost to the rachis, superior pinnæ adnate at the base and slightly decurrent, the lobes shorter, all the lobes oblong subfalcate obtuse or with an oblique acute point, veins with four pairs of rather short veinlets simple or forked soriferous at or near the apex, the sori thus forming series nearer the margin than the costule.—*Aspidium rotundatum, Willd. Sp. Pl. v. p. 247? Plum. Fil. p. 29. t. 38.*

Hab. Martinique, *Plumier.* Near Tarapota, Eastern Peru, *Spruce, n. 4656.*—

Plumier's figure is the authority for Willdenow's *Aspid. rotundatum*, which has again been referred by authors to *Polyp. flavo-punctatum*. But our present plant seems to accord far better with it. In texture and in the pellucido-punctate character of the frond it exactly accords with *P. Tijuccanum*, but the shape of the pinnæ and the venation are very different.

165. *P. (Phegopteris) flavo-punctatum*, Klfs.; caudex apparently erect stout woody, stipes  $1\frac{1}{2}$  foot and more long stout sparsely scaly, frond ample 2-3 and more feet long  $1-1\frac{1}{2}$  foot and more wide thin-membranaceous but firm with copious scattered minute pellucid yellow dots, broad-ovate lanceolate sharply acuminate pinnated below the pinnæ upward gradually becoming sessile and decurrent and at length quite coadunate at the deeply pinnatifid apex, pinnæ inferior ones very long 9-10 inches long from  $\frac{1}{2}-1\frac{1}{2}$  inch broad petiolate all of them from an obliquely cuneate base sharply and long-acuminate subfalcate or subflexuose the margin more or less serrate or lobato-dentate or pinnatifid with ovate obtuse lobes, veins copious all free rather distant pinnated with 6-8 veinlets simple or rarely forked which thus bear the sori in two series corresponding with and parallel to the primary vein but having a scattered appearance upon the disk of the pinnule, rachis often very stout deciduously paleaceous with subulate hairlike scales which sometimes extend to the under side of the costæ.—Var. *a*, *Kaulfussii*; pinnæ coarsely dentate or subserrate. *P. flavo-punctatum*, *Kaulf. En. Fil. p. 108*. *Phegopteris*, *Fée, and Metten. Phegopt. p. 20*. *Polyp. longicaudatum*, *Liebm. Fil. Mex. p. 57*.—Var. *β*, *pinnatifida*; pinnæ more or less deeply pinnatifid. *P. Prionitis*, *Kze. in Flora, 1839, Beibl. i. p. 29, and in Herb. nostr.* *Phegopt.*, *Fée, Gen. p. 243*. *Phegopteris Tijuccanum*, *Eat. in Fil. Wright. et Fendl. p. 207, and in Herb. nostr. (not Raddi)*.

Hab. South America and Martinique, *Ryan, Belanger, in Herb. nostr.* Ocaña, *Schlim, n. 596*. Tarapota, Eastern Peru, *Spruce, n. 412*. Mexico, *Liebm., in Herb. nostr.*—*β*. Brazil (*Moricand*), Caraccas, *Miquel*. Venezuela, *Fendler, n. 198*. West Indian Islands, frequent: Martinique, *Belanger*; Dominica, *Imray*; Jamaica, *Wilson, n. 516*.—Remarkable for its thin papery texture, and for the pellucid dots in the substance of the frond. These yellowish dots, however, are not close and compact, as in the following species, but much more sparse and distant.

166. *P. (Phegopteris) Tijuccanum*, Raddi; caudex? (a small portion that I possess with fibrous radicles of Mr. Spruce's n. 4654, is most densely covered with a thick floccose mass of delicate ferruginous long linear-subulate flexuose scales), stipes  $1-1\frac{1}{2}$  foot long stout crinite with scales

analogous to those just described but of a darker colour and these are continued up the rachis, fronds 2-2½ feet long nearly 1 foot wide subcoriaceous opaque brownish-green when dry copiously dotted with crowded pellucid yellowish points, pinnated pinnatifid only at the very extremity by the union of 2-3 of the upper pinnæ, pinnæ 3-5 inches long 1-1¼ inch broad petiolate from a broadish subunequally cuneate and truncated base oblong rather suddenly acuminate pinnatifid ½ or ¼ of the way down to the costa, segments broad short in comparison to the breadth of the pinnæ very obtuse at the base but the acute point turning upwards, veins pinnated distant, the branchlets or veinlets 10-12 elongated erecto-patent each bearing a sorus below the middle thus forming a series on each side the primary vein, veinlets all free but the apices approach each other near the sinus without uniting, costæ and costules especially beneath subhispidopaleaceous.—*Raddi, Fil. Bras. p. 25. t. 37 (not Eat. in Wright. et Fendl. p. 107).* *Phegopteris, Fée, and Metten. Phegopt. p. 20.*

Hab. Brazil, *Raddi*. San Gabriel, *Spruce, n. 2100*, and Tarapota, Eastern Peru, *Spruce, n. 4657 and 4742* (more deeply pinnatifid). British Guiana, *E. Schomburgk, n. 1128* (*P. refulgens, Kl. in Herb. nostr.*).—I have no authenticated specimen of *P. Tijuacanum* of *Raddi*; but *Raddi's* figure so well represents the specimens I have referred to that species, that I can hardly have a doubt of their identity. As in *P. flavo-punctatum*, pellucid yellow dots in the fronds (only seen when held between the eye and the light) are very conspicuous; but here, notwithstanding the thicker substance and generally opacity of the frond, the pellucid dots are much more numerous and better defined, exhibiting a more reticulated appearance. The pinnæ are, too, much broader, and the pinnatifid character is confined to the apex.—What is *P. alloopterum*, *Kze. and Schlecht. in Linnæa, xxv. p. 50?*, of which it is said, “Non nisi cum *P. Tejuccano, Raddi*, aliquam ostendit similitudinem,” etc.

167. *P. (Phegopteris) subobliquatum, Hook.*; caudex stout ascending, stipites tufted 1-1½ foot long tawny-brown scaleless, fronds 12-14 inches and more long 6-8 inches broad subcoriaceous-membranaceous pellucido-punctate glabrous ovato-lanceolate acuminate pinnate, pinnæ distant all petiolate horizontal few (about twenty) 3-4 inches long ¾ to scarcely 1 inch broad from an obliquely cuneated base truncated and auricled above subexcised beneath oblong acuminate lobato-pinnatifid at the margin with short ovate or rounded lobes and acute sinuses, the apex serrated, terminal pinnæ broad-ovate acuminate irregularly but not deeply pinnatifid, veins subflexuose pinnate with about 6-8 simple veinlets each bearing a dorsal sorus near the middle, rachis slender.

Hab. Surinam, *Hostmann*, n. 15. Pará, *Spruce*, n. 36.—I can find no description to accord satisfactorily with this species. The petiolated, auricled, and oblique base of the pinnæ, excised, as it were, at their inferior margin, and their shallow lobes, are its chief distinguishing marks. Spruce's and Hostmann's specimens are identical, and both are perfectly glabrous, and also destitute of scales.

168. *P. (Phegopteris) macrophyllum*, Hook.; caudex?, stipes very stout thick as one's little finger terete grooved on one side dark-brown glossy 2 feet (and probably much more) long paleaceous below with rather large brown ovato-acuminate firm scales, upwards and on the stout rachis the scales vary in shape are smaller delicate membranaceous spreading and often fringed, frond ample firm-membranaceous glabrous dark-green pellucido-punctate 3 feet and more long and (judging from the length of the largest pinna) 32 inches wide in the broadest part broad-ovate acuminate pinnated pinnatifid at the extremity, lowest pinnæ long-petioled higher up sessile and gradually more and more adnate and decurrent at length coadunate, several pairs measure 16–17 inches in length with a breadth of  $2\frac{1}{2}$ –3 inches from a broad and truncated rarely contracted base oblong finely acuminate into a serrated point deeply and regularly pinnatifid to within  $\frac{1}{4}$  of an inch of the costa, segments numerous approximate forming narrow sinuses, horizontal 1–1 $\frac{1}{2}$  inch long oblong or scarcely subfalcate very obtuse entire or obscurely serrated, veins 12–14 on each side the costule short and patent simple and then the sorus is dorsal, or forked and the sorus is terminal or lateral from the extreme shortness of the branch that bears it, thus forming two very regular series one on each side the costule nearer the latter than the margin, the largest sori are always on the disk of the pinnæ nearest the main costa.

Hab. Tarapota, Eastern Peru, *Spruce*, n. 4720.—This is another of the pellucido-punctate species of § *Phegopteris*, and I cannot but look upon it as a very distinct species, although the characteristic marks are not easily defined in words. The size of the principal primary pinnæ is quite remarkable, and the great length of the segments.

169. *P. (Phegopteris) caudatum*, Klfs.; caudex stout erect, stipes tufted 1 $\frac{1}{2}$ –2 feet long sparsely and deciduously paleaceous with pale lanceolate scales 2–3 feet long 12–14 inches wide broad-ovate acuminate firm-membranaceous opaque pellucido-punctate pinnated pinnatifid at the extremity, pinnæ very patent 6–8–10 inches long 1–2 inches broad nearly opposite distant, lowest ones petiolate, upper

ones quite sessile adnate and decurrent (often the entire inferior lobe has more attachment to the rachis than to the pinnæ), uppermost ones confluent and also decurrent, all oblong or oblong-lanceolate ending in a finely acuminate serrated point pinnatifid to within a short distance of the rachis, segments distant linear-oblong subfalcate acute coarsely serrated, sinuses very broad and obtuse, veinlets distant simple or forked sometimes pellucid often obscure, sori dorsal or terminal upon a short branch nearer the margin than to the costule, costæ and costules quite glabrous.—*Kaulf. En. Fil. p. 113. Raddi, Fil. Bras. p. 25. t. 39 (two pinnae only, coarsely represented, but very faithful). Phegopteris, Fée, and Metten. Phegopt. p. 27. Polypod. pediculariæfolium, Pr.*—Var.  $\beta$ , segments less numerous on the pinnæ and broader very obtuse.

Hab. Brazil, *Raddi, Gardner, n. 131, Macrae. Jamaica, Wilson, n. 538. Cuba, C. Wright, n. 1053.*— $\beta$ . Venezuela, *Fendler, n. 194.*—A distinct and well-marked species, varying somewhat in the size of the pinnæ and segments, and in the more or less deep serratures. It has the pellucid dots of the three preceding species, but is extremely different in other respects.

170. *P. (Phegopteris) salicifolium*, Hook.; caudex?, stipes a foot long stramineous smooth and scaleless glossy rather slender, frond 14 inches long 8–10 inches broad firm-coriaceo-membranaceous dark-green opaque ovate acuminate pinnate to the very apex, pinnæ 4–6–7 inches long distant alternate erecto-patent subfalcate from an obtuse rather contracted unequally cuneate base narrow-lanceolate shortly petiolate tapering above the middle into a long-acuminate entire point, the rest of the margin is pinnatifido-lobate, lobes small rounded obtuse with shallow rounded sinuses, terminal pinna like the rest but more petiolate, veins patent fasciculato-pinnate, veinlets 6–8, sori large copious in the upper half of the frond extending to the very narrow apex dorsal upon the veinlets not arranged in any regular series but scattered sometimes over the whole pinna, rachis slender flexuose firm and glossy and together with the costæ (prominent on the under side) very pale straw-colour.

Hab. Tovar, Venezuela, *Fendler, n. 474.*—I do not find this noticed in Eaton's 'Filices Wrightianæ et Fendlerianæ.' It appears to me to be a good and a new species, with the pinnæ singularly uniform in character.

171. *P. (Phegopteris) pauciflorum*, Hook.; caudex short erect woody paleaceous, stipites aggregated 6–8 inches long

brown glabrous and scaleless, fronds firm subcoriaceo-membranaceous 8-10 inches long 4-5 inches wide ovate subdeltoïd partially villous above chiefly on the veins, beneath copiously so with rather long soft hairs most so on the costæ and veins pinnated pinnatifid at the apex, pinnæ  $2\frac{1}{2}$ -3 inches long  $\frac{1}{2}$  to nearly 1 inch wide from a rather broad and rounded base oblong-lanceolate obtuse remote pinnatifid, lower ones petioled and deeply lobed halfway down to the costa gradually less deeply lobed upward and more elliptical the rest coadunate, lobes or segments rounded very obtuse entire or subsinuato-dentate, rachis villous on the upper half alate by a narrow but very distinct wing uniting as it were the bases of the distant pinnæ, veins pinnated subflexuose, veinlets 8-10 distant quite free extending to the margin, lowest pairs only soriferous below the middle, sori small very remote and forming an imperfect line or series on the pinna nearer the costa than the margin.

Hab. Surinam, *Hostmann*.—The four fronds I possess of this Fern are remarkably uniform in the characters above given. I can detect no trace of involucre on the small and unusually distant sori.

172. *P. (Phegopteris) rude*, Kze.; "frond lanceolate coriaceous one-coloured with the veins hairy on both sides pinnato-pinnatifid, pinnæ moderately distant alternate erectopatent slightly curved elongato-lanceolate acuminate serrated at the apex deeply pinnatifid, segments oblong subfalcate obtuse veined, lowest ones abbreviated, sori submarginal numerous minute, costæ rachis and long angulate stipes canohirsute." Kze. in *Linnaea*, xiii. p. 133. *Phegopteris*, Fée. *Metten. Fil. Hort. Lips.* p. 83 ("sori medii inter costulam et marginem"). *Phegopt.* p. 17. *Glaphyropteris*, Pr. *Also-phila pilosa*, Mart. et Gal. *Fil. Mex.* p. 78. t. 22 (consequently of this work, Vol. I. p. 47).

Hab. Mettenius gives Mexico, *Liebold*, and Columbia, *Moritz*. Authentic specimens of these I possess, and others sufficiently corresponding with them from New Granada, *Linden*, n. 1010, 502; Venezuela, *Fendler*, n. 187 and 197?; Ecuador, *Jameson*; Peru, *Mathews*, n. 975; Galapagos, *Wood*?; Brazil, *Gardner*? (too membranaceous and too glabrous).—This appears to me to be very near some forms of *P. decussatum*, and the only figure quoted (*Martens* and *Galeotti*) is as much like the one as the other. Its usually smaller size, more rigid texture, shorter segments to the pinnæ, and absence of the remarkable scale at the base of the pinnae, and the greater degree of hairiness, are probably the chief distinctions. Yet though I do not find a scale on any of my authenticated specimens, I find a scar as if it had been early deciduous.

173. *P. (Phegopteris) decussatum*, L.; "caudex erect and



as well as the base of the stipites clothed with broadly adnate ovate acuminate glandular scales" (*Metten.*), stipites 1-2 (and probably much more) feet long pubescenti-villous reddish-brown from the size of a goose-quill to the thickness of one's little finger, on two opposite sides are several large ovate acuminate membranaceous scales generally attached within a small spine-like process, fronds from 1 foot (and fertile) to 4 feet (and probably much more) long "the tallest specimen 9 feet high and not otherwise distinguishable from the humblest" (*Spruce*) broad-ovate acuminate membranaceous or more or less coriaceous often minutely resinoso-glandulose beneath, pinnated pinnatifid only at the apex, pinnæ very numerous approximate nearly horizontal 10-12-14 (probably much more) inches long 1-1½ inch wide sessile or nearly so with a large scarioso brown deciduous scale at the point of insertion beneath, from a broad truncated base elongato-oblong suddenly acuminate into a narrow entire point deeply and nearly to the stout costa pectinato-pinnatifid, the segments ½-¾ inch long linear-oblong horizontally spreading with great regularity very obtuse entire parallel, sinuses very narrow acute, veins very evident simple close parallel oblique, sori small copious dorsal below the middle so as to form two series nearer the costule than the margin sometimes quite costular, rachis and costæ generally downy often mixed with hairs, the segments often ciliated.—*Linn. Sp. Pl.* p. 1555. *Sw. Syn. Fil.* p. 40. *Willd. Sp. Pl.* v. p. 204. *Phegopteris*, *Metten. Phegopt.* p. 17. *Glaphyopteris*, *Pr.* *Polypod. Grammicum*, *Spr.* *Gymnogramme microcarpa*, *Fée, 7me Mém.* p. 43. t. 20. f. 5 (*very faithful*). *Plum. Fil.* p. 19. t. 24.

Hab. Tropical America. Abundant in the West Indian Islands. Venezuela, *Fendler*, n. 373. Panama, *Sutton Hayes*. Ecuador, *Spruce*, n. 5255, 5651. Peru, *Mathews*, *Lechler*.—One of the handsomest of South American Ferns.

174. *P. (Phegopteris) paludosum*, Bl.; caudex?, stipes elongated 1½ foot and more long scaleless in all my specimens fusco-stramineous (sometimes bright chestnut-coloured), fronds 1½-3 feet long 6-12 inches wide firm subcoriaceous-membranaceous broad-oblong-lanceolate acuminate bipinnate only below, above pinnate pinnatifid at the apex, pinnæ distant subpetiolate alternate 3-8-10 inches long 1-2 inches broad in some cases suberecto-patent elongato-oblong acuminate, those that are again pinnated have

distant patent pinnules  $\frac{1}{2}$ –1 inch long from a broad always adnate but not decurrent base oblong obtusely acuminate always more or less deeply pinnatifid at the margin, basal pair often more elongated, superior pinnæ deeply pinnatifid with oblong obtuse generally entire segments, veinlets rather distant simple or forked, sori rather large not numerous intermediate between the costule or primary vein and the margin, rachis costæ costules and principal veins often hirsute.—*Bl. Fil. Jav. p. 192. t. 90.* *Phegopteris, Metten. Phegopt. p. 29.* *Polyp. brunneum, Wall. Cat. n. 333.* *P. longipes, Wall. Cat. n. 316.* *P. adnatum, Wall. Cat. n. 328.*

Hab. Java, *Blume, De Yriese* (the specimens from this locality are among the largest I have seen, and are well represented in *Bl. Fil. Jav.*). Ceylon, *Mrs. Genl. Walker, Gardner, n. 1151 and 1288.* Probably common all over Northern India, from the West, *Edgworth, Strachey and Winterbottom, Thomson*, to Sikim, Khasya, and Assam, in the East, *Wallich, Griffith, Hooker fil. et Thomson* (800–1000 feet in East Himalaya). Nilghiries, *G. Thomson, Beddome*.—A really well marked and very common Indian Fern, when seen in a perfect state, invariably bipinnate. In habit it much resembles our *Nephrod. (Lastrea) microstegium* (see p. 112, Tab. CCL.), but it wants the connecting wing to the pinnules, and is quite destitute of involucre.

175. *P. (Phegopteris) Phegopteris, L.*; caudex very long creeping, stipites distant a span to a foot high stramineous glossy brown and paleaceous at the base, fronds about equal in length to the stipes membranaceous triangular-ovate acuminate pinnated deeply pinnatifid above, pinnæ generally opposite approximate narrow-oblong-lanceolate horizontal, lowest pair remote deflexed and pointing forward hairy and ciliated, all of them pinnatifid more than halfway down to the rachis, segments oblong-ovate obtuse nearly entire, the basal ones decurrent and adnate, veinlets simple or forked, sori marginal inserted below the apex of the veinlets.—*Linn. Sp. Pl. p. 1550. Sw. Syn. Fil. p. 40. Willd. Sp. Pl. v. p. 269. Schk. Fil. t. 20. Engl. Bot. t. 2224. Hook. et Arn. Brit. Fl. ed. 8. p. 580. Gray, Man. Fl. U. S. Illustr. p. 59. Hook. Brit. Ferns, t. 3. P. connectile, Mich. Fl. Bor. Am. ii. p. 271.* *Phegopteris vulgaris, Metten. Phegopt. p. 15.* *Pheg. polypodioides, Fée.*

Hab. Mountain districts in Great Britain, and generally throughout Europe, from Iceland to Switzerland and Savoy; in Altai, Siberia, and Kamtschatka, Manchuria (*Wilford*). Japan, *Babington*. Northern United States, Canada to the Rocky Mountains, Greenland, and Labrador. North-west America, *Barclay*.

176. *P. (Phegopteris) hexagonopterum, Mich.*; caudex long creeping, stipites 1–1½ foot long very glossy stramineous

red, fronds 6-10 inches long and quite as much or more broad-triangular acuminate membranaceous pinnate, below subbipinnate, lowest pinnæ the largest 4-6 inches long  $1\frac{1}{2}$ - $2\frac{1}{2}$  inches broad semiovato-lanceolate bipinnatifid or subpinnate, the rest lanceolate more or less connected by a blunt triangular decurrent intermediate lobe deeply nearly to the rachis pinnatifid with oblong subacuminated coarsely crenato-serrate or entire segments, rachis and costæ stramineous and glossy, veins twice or thrice forked, veinlets bearing the marginal sori at the apex, costule and veins beneath often hairy.—*Mich. Fl. Bor. Am.* ii. p. 271. *Sw. Syn. Fil.* p. 40. *Willd. Sp. Pl.* v. p. 200. *Hook. et Grev. Ic. Fil. t.* 210. *Asa Gray, Man. of Bot. Illustr.* p. 590. *Phegopteris*, *Fée. Metten. Phegopt.* p. 15.

Hab. North America, from Canada, *Goldie*, to New Orleans (*Drummond*) and Florida (*Chapman*).—A larger and stronger growing plant than the preceding species and rather more compound, and a triangular lobe is decurrent, as it were, in the sinus, from the base of the pinnæ above (often coadunate, with the pinnæ below), giving a remarkable appearance to the whole Fern. As far as I know, it is peculiar to eastern North America.

\*\*\*\* *Fronds bipinnate, rarely subtripinnate.* 177-188.

(*Polystichoid.* *Habit of Polystichum.* 177-181.)

177. *P. (Phegopteris) rigidum*, *Hook. et Grev.*; caudex short very stout erect or ascending branching upwards densely paleaceous with large reddish-brown ovate long-pointed ciliated scales mixed with smaller lanceolate ones, stipites tufted 3 inches to a foot long more or less densely as well as the rachis clothed with similar but smaller scales as the caudex, fronds rigid-coriaceous from a span to 2 feet long 2-3 inches to a span broad usually oblong or oblong-lanceolate but the larger forms sometimes a span broad bi-tripinnate, ultimate pinnæ very variable obliquely ovate or subrotund more or less auricled, the margin nearly entire or dentato-serrate with spinous teeth.—*a, vulgare*; fronds oblong rather obtuse bipinnate, pinnæ obtuse, pinnules ovato-rotundate unequally subrhomboidal generally auricled, serratures few and spinulose as is the short acute apex. *P. rigidum*, *Hook. et Grev. Ic. Fil. t.* 163, and in *Bot. Misc.* p. 239.\*

\* At the same page of the *Bot. Miscellany* appear three other very imperfectly described Peruvian species of *Polypodium* (*P. stipitatum*, *P. gracile*, and *P. fulvescens*, of *Hook. and Grev.*); but as they do not exist in my herbarium, and as I can offer no further remarks in illustration, it is better to omit them. These were published in 1831, when the Ferns of the Peruvian Andes were very imperfectly known.

*Phegopteris*, *Metten. Phegopt. p. 10* (incorrectly referred to *Aspid. mohrioides*, at *p. 26* of this volume).— $\beta$ , *polyphyllum*; stipites slender a span to  $1\frac{1}{2}$  foot long oblong-lanceolate decidedly acuminate bipinnate, pinnules generally very numerous, pinnæ rhomboidal ovate acute and mucronate the margin mucronate serrate. *Nephrodium polyphyllum*, *Pr. Rel. Hænk. i. p. 37*. *Polystichum*, *Pr. Tent. Pterid. p. 83*. *Nephrod. trapezoides*, *Pr. Rel. Hænk. p. 37. t. 6. f. 1*. *Hook. et Grev. Bot. Misc. i. p. 240*. *Polystichum Hænkeanum*, *Pr. Tent. Pterid. p. 83*. *Aspid. plicatum*, *Pæppig, in Herb. Hook., and Kze. in Linnæa, ix. p. 94*. (*Mettenius refers the last three to Aspidium mohrioides*.) *Aspid. vestitum*, *Metten. in Lechl. Fil. Peruv. p. 34* (not *Sw.*), and in *Hook. Herb. n. 2087*.— $\gamma$ , *majus*; general characters of the last, but with fronds three to four times as large  $1\frac{1}{2}$ –2 feet long a span broad with quite the aspect of *Aspid. aculeatum*, but destitute of involucre.— $\delta$ , *Spruceanum*; stipes  $1$ – $1\frac{1}{2}$  and more foot long, fronds the same from 5–10 inches wide broad-lanceolate acuminate copious but laxly tripinnate, pinnules all petiolate especially the ultimate one which is always the largest singularly convex above orbiculari-spathulate the margins much reflexed copiously spinuloso-serrate.

Hab. *a, vulgare*. Andes of Peru and Ecuador, alt. 12,000–16,000 feet, *Hænke, Cruckshanks, Jameson, n. 87, Maclean, Lechler* (near Tabina), *n. 2087, Mathews* (Obragilla), *n. 609*. New Granada, *Hartweg, n. 1510*.— $\beta$ , *polyphyllum*. Andes of Ecuador and Peru, apparently similar localities to the last, *Jameson, n. 209* (Pichincha, etc., alt. 11,000–14,000 feet), *Pæppig* (*Aspid. trapezoides, Kze.*), *Maclean, Lechler, n. 2109* (*Aspid. polyphyllum, Metten.*) and 2020 *a* ("Aspidium parallelogrammum, *Kze.*"), *Cruckshanks* (Huayallay, near Pasco). New Granada: Sierra Nevada, *Purdie*; Ocaña, alt. 8,000–10,000 feet, *Schlim, n. 366*.— $\gamma$ , *majus*. Mount Guyarapate and Tunguragua, Ecuador, *Spruce, n. 5266*. New Granada, *Hartweg, n. 1509*.— $\delta$ , *Spruceanum*. Mount Guayrapata, Ecuador, *Spruce, n. 5267*, but the form above described is accompanied by two other specimens, evidently considered by Mr. Spruce to belong to one and the same species: of these, one is a slightly modified form of var.  $\beta$ , the other intermediate between it and the normal form of var.  $\gamma$ ; and again other specimens from Condorasto, marked by Mr. Spruce "cfr. n. 5627," are our  $\beta$  and  $\gamma$ .—This one species of polystichoid *Polypodium* would furnish a rich harvest to one ardently devoted to the formation of new species on slight grounds, as its near ally *Aspid. (Polystichum) aculeatum* does among true *Aspidiaceæ*; and from some common forms of which the present can hardly be distinguished, but by the absence of involucre.

178. *P. (Phegopteris) pycnolepis*, *Hook.*; caudex short stout erect and as well as the young circinate shoots densely and richly covered with large dark-chestnut glossy brown lanceolate scales mixed with much smaller and narrower

crisped ferruginous ones, stipes a span to a foot and occasionally much more long paleaceous with the scales above described, but smaller ones and also of two kinds often more or less lacerated mixed with them, fronds very firm rigid-coriaceous thick oblong-lanceolate acuminate  $1\frac{1}{2}$ –2 (and even 4) feet long 3–6 inches or a span wide bipinnate, pinnæ erectopatient mostly crowded as well as the pinnules which are more patient subpetiolate oblique ovate or rhomboid-ovate cuneate at the subauricled base acute often mucronate, the margin more or less revolute entire or spinuloso-dentate, sori soon confluent, rachis and costules densely squarrosopaleaceous often red ferruginous with scales of different sizes generally much crisped sometimes very large.—*Phegopteris*, *Metten. Phegopt. p. 11.* *Aspid., Kze. in Kl. Linnæa*, xx. p. 365. *A. gelidum*, *Kze. in Kl. l. c. p. 365.* *Polystichum*, *Fée, Gen. p. 278.* *Phegopt. cochleata*, *Metten. Phegopt. p. 11.*

Hab. Columbia, Tovar, *Moritz (from Mettenius)*, n. 294 (*A. gelidum*, *Kze.*) and 290. Ocaña, *Schlim*, alt. 10,000–11,000 feet. Bogota, *Holton*. Caraccas, *Linden*, n. 237, 505. Sierra Nevada, S<sup>a</sup> Martha, near the snow, *Purdie*. Venezuela, *Fendler*, n. 171 (*Aspid. cochleatum*, *Eat.*). Peru: Andes, *Maclean*; above Titicaca, *Lechler*, n. 2011 (*Aspid. robustum?*, *Kze. Metten.*); Ecuador, Quito, *Jameson*; Bolivia, *Pentland*.—*β. elatum*; stipes as thick as one's finger at the base, together with the lower part of the rachis densely squarrose, with scales of extraordinary size,  $\frac{1}{2}$ –1 inch long; fronds  $4\frac{1}{2}$  feet long; pinnules falcate, acuminate, sharply auricled. Ecuador, rocky shady places at the foot of Mount Tunguragua ("Felix caespitosa pulcherrima, stipite nonnunquam prolongo 5-pedali"), *Spruce*, n. 5623.—A very stout, compact-growing plant, with much of the aspect of some forms of *Aspid. aculeatum*, and varying very much in the scariose and scaly covering.

179. *P. (Phegopteris) platyphyllum*, *Hook.*; caudex short erect stout paleaceous with large opaque ovate scales, stipites tufted a span to  $1-1\frac{1}{2}$  foot long slender stramineous (as well as the rachis) paleaceous below, fronds 1–2 feet long, in a young but fertile state often oblong-lanceolate much acuminate simply pinnate with the rachis sometimes prolonged rooting and proliferous, lowest pinnæ sometimes again pinnate, when mature the fronds are  $1\frac{1}{2}$ –2 feet and more long 8–10 inches to a foot and more wide coriaceous-membranaceous full-green bi- rarely tri-pinnate broadly ovate always ending in a long very acuminate simply pinnated apex, primary pinnæ 5 inches to a span long 1–2 inches broad spreading pinnatifid at the acuminate apex, pinnules horizontal  $\frac{3}{4}$ –1 inch long petiolulate from an obliquely cuneated base above truncated and acutely auricled ovate acute sometimes falcate remotely spinuloso-serrate, sori sparse small.—*Phegopteris*,

*Metten. Phegopt. p. 12. Aspid., Willd. Sp. Pl. v. p. 255. Metten. Fil. Hort. Lips. p. 88. t. 22. f. 1, 2 (excellent). Polystichum, Pr. Phegopt. polystichiformis, Fée, Gen. p. 247. Polypod. polystichioides, Kl. in Linnæa, xx. p. 383.*

Hab. Caraccas, *Bredemeyer, Moritz, n. 45 and 200, Linden, n. 158, Otto, n. 611. Venezuela, Fendler, n. 175. Guatemala, Skinner. Jamaica, Baneroft, Wilson. Cuba, C. Wright, n. 832, 1057 (simply pinnate, rachis prolonged and rooting). Brazil, Gardner, n. 132, 54 (large, bipinnate, some pinnules  $1\frac{1}{2}$  inch long). South Brazil, Sellow, Fox, n. 120. Tarapota, Spruce, n. 3965. Andes of Ecuador, Jameson, n. 696. Chimborazo, alt. 3000 feet, Spruce, n. 3965, and Tunguragua, alt. 7000 feet ("fronds sometimes 6 feet long; stipes long, and stout in proportion, very paleaceous, with broad blackish scales,  $\frac{3}{4}$  of an inch long; rachis also very paleaceous, with ferruginous, subulate, curled, long scales," Spruce, n. 5430.) Peru, Mathews, n. 1848, Maclean.—One of the most easily recognized of all this group.*

180. P. (*Phegopteris*) *Drepanum*, Hook.; caudex?, stipes a span to  $1\frac{1}{2}$  foot long very scaly especially at the base, fronds coriaceous-membranaceous  $1\frac{1}{2}$ –2–3 feet long 6–10–12 inches wide ovato-lanceolate acuminate bipinnate, primary pinnæ spreading petiolate 4–6 inches long from a broad base 1–2 inches wide gradually acuminate, lowest superior pinnae always the largest and petiolate, the rest gradually smaller oblong-lanceolate falcate the base unequally cuneate, superior base truncated and more or less auriculate the margin acutely but not spinulose serrated, from near or below the middle of the pinnæ the pinnules become confluent and the upper half pinnatifid, veins erecto-patent usually once or twice forked, sori small in two series nearer the costule than the margin, rachis costæ stramineous sparsely paleaceous.—*Aspidium, Sw. Syn. Fil. p. 54 and 255. Schk. Fil. t. 43 b. Lowe, Rev. R. T., Fl. Mad. p. 6. Willd. Sp. Pl. v. p. 257. Polystichum, Pr. Phegopteris, Metten. Phegopt. p. 12.*

Hab. Madeira, *Mason, Lowe* (Rio de St. George, alt. 3000 feet), *Lemann, etc.*—Peculiar, I believe, to the Island of Madeira; but I had myself, at one time, confounded it with a polystichoid *Nephrodium* of China.

181. P. (*Phegopteris*) *sylvaticum*, Col.; caudex?, stipites 4–5 inches to nearly a span long and as well as the rachis more or less squarrose with paleaceous ferruginous soft flexuose subulate or crinite scales varying in size and generally mixed with linear-lanceolate intensely black glossy firm curved ones pale-brown at the margin, fronds subcoriaceous 1–2 feet long 3–8 inches wide lanceolate acuminate bipinnate, primary pinnæ distant petiolate 2–4 inches long  $\frac{3}{4}$ – $1\frac{1}{2}$  inch broad oblong-acuminate, pinnules  $\frac{1}{2}$ – $\frac{3}{4}$  inch long 1–2 lines wide from

an obliquely cuneate sessile base ovato-lanceolate pinnatifid halfway down or more to the costule with 5–9 acute spinulose subincurved lobes simple or occasionally bifid, veins usually once or twice forked, sori generally as many as there are lobes about equidistant between the costule and the margin.—*Colenso, in Tasman. Phil. Journ. Hook. fil. Fl. Nov. Zeal. ii. p. 41. t. 81 (excellent). Metten. Phegopt. p. 11.*

Hab. New Zealand: Northern Island, *Colenso*; Port Nichol and Akeroa, Middle Island, *Lyall*.—A very distinct species, and very uniform in its characters.

*Polypodium anomalum* of Arnott and Hooker, in *Hook. Journ. Bot. viii. p. 360, t. 11*, which might be expected to be in the above section, has been recently found by Mr. Thwaites to have occasionally involucre of a true *Polystichum*, and it will consequently be found, at p. 27 of this volume, as *Aspidium (Polystichum) anomalum*.

182. *P. (Phegopteris) Dryopteris*, L.; caudex long creeping branched more or less scaly, stipes a span to a foot or more long very slender stramineous scaly below, fronds thin membranaceous 5–6 inches and more long pentangular-deltoid tripartito-bipinnate, primary divisions long-petioled (especially the terminal one) deltoid, secondary pinnæ mostly sessile  $1\frac{1}{2}$ –2 inches long oblong or ovato-oblong rather obtuse deeply pinnatifid sometimes again pinnate at their base, segments oval entire or the inferior ones pinnatifido-serrate, veins forked, sori dorsal on the upper veinlet nearer the margin than the costule.—*Linn. Sp. Pl. p. 1555. Engl. Bot. t. 616. Sw. Syn. Fil. p. 42. Schk. Fil. t. 25. Willd. Sp. Pl. v. p. 209. Hook. et Arn. Br. Fl. ed. 8. p. 580. Ledeb. Fl. Alt. a, genuinum; (his  $\beta$  is *P. Robertianum*). Hook. Brit. Ferns, t. 4. Phegopteris, *Fée. Metten. Phegopt. p. 9. Polypod. calcareum, Ph. N. Am. Fl. ii. p. 639.**

Hab. Mountain districts throughout Britain and Europe generally. Northern India, Western Himalaya, *T. Thomson*. Siberia, Japan, Greenland; Labrador and Hudson's Bay to British Columbia on the Pacific. Rare in the Northern United States; not found in the South.

183. *P. (Phegopteris) Robertianum*, Hoffm.; caudex long creeping branched scaly, stipes a span to a foot long stramineous slender brown at the base, fronds 6–10 inches long rather firm-membranaceous glandularly pubescent at length glabrous subpentangular-deltoid or triangular-ovate tripartito-bipinnate, primary pinnæ long-petioled (especially the intermediate or terminal one) deltoid-ovate, secondary pinnæ mostly sessile oblong or ovato-oblong obtuse deeply pinna-

tifid at the base and there sometimes again pinnate, segments oval-oblong entire or the inferior ones pinnatifido-serrate, veinlets mostly simple bearing the sori towards the apex near the margin, sori often confluent.—*G. F. Hoffm. Fl. Germ. part ii.* 1795. in *Add. Moore, Brit. Ferns, Nat. Print. t. 6.* *Hook. Gard. Ferns, t. 5.* *P. calcareum, Sm. Brit. Fl. p. 117* (1804). *Engl. Bot. t. 1525. Willd. Sp. Pl. v. p. 210.* *Hook. et Arn. Brit. Fl. ed. 8. p. 581.* *Phegopteris, Fée. Metten. Phegopt. p. 9.* *Polypod. Dryopteris, Dicks, t. 16, and Bolt. Brit. Ferns, p. 53. t. 1* (and of American authors, according to Mr. Moore). *Benth. Handb. of Brit. Fl. p. 626.* —*Var. β. Wahl. Fl. Suec. ii. p. 668.*

Hab. Limestone débris, northern and western parts of England, *J. E. Smith.* Stated to be a native of Germany and North America; but this species is often confounded with *P. Dryopteris*, and, by myself as well as others, is considered as doubtfully distinct.—See, for remarks on the two species, our 'British Ferns,' under plate 3.

184. *P. (Phegopteris) alpestre*, Hoppe; glabrous, caudex oblique, stipites 4–6 inches long rather stout scaly below, fronds membranaceous flaccid  $1\frac{1}{2}$ –2 feet long oblong-lanceolate acuminate bipinnate, primary pinnae patent or erecto-patent 3–4 inches long  $\frac{3}{4}$ –1 inch broad from a broad sessile base gradually acuminate, pinnules  $\frac{1}{2}$  an inch long horizontally patent oblong-ovate subacute sessile more or less pinnatifid at the margin, segments short ovate sharply inciso-serrate, veins twice or thrice forked, sori scattered dorsal upon the veinlets.—*Hoppe, in Sprengel. Sowerby, Ferns of Gt. Britain, p. 84. t. 49.* *Hook. et Arn. Brit. Fl. ed. 8. p. 581.* *Hook. Brit. Ferns, t. 6.* *Phegopteris, Metten. Phegopt. p. 10.* *Aspidium, Sw. Syn. Fil. p. 42 et 59.* *Willd. Sp. Pl. v. p. 280.* *Schk. Fil. p. 58. t. 60.* *A. Rhæticum, Sw. Syn. Fil. p. 59.* *Willd. Sp. Pl. v. p. 280 (excl. Syn. Linn.).* *Polypod., Villars.* *Athyrium, Roth.—β, flexile;* stipes scarcely any, pinnae short ovato-lanceolate spreading or deflexed, pinnules distant. *Moore, Br. Ferns, Nat. Print. t. 6.* *Polypod. flexile, Moore.*

Hab. Rare in the highland mountains of Scotland; more frequent in Norway, Lapland, Russia, Germany, and on the Alps in the south. In North-west America, *Dr. Lyall.*—Habit of *Asplenium Filix-femina*, but a true *Polypodium*, § *Phegopteris*.

185. *P. (Phegopteris) sessilifolium*, Hook.; caudex?, stipes?, frond 2 feet (and more) long a foot broad ovate acuminate firm-membranaceous bipinnate, pinnae sessile opposite or



very nearly so patent 8-10 inches long 3 inches broad at the base gradually diminishing to the acuminate and subpinnatifid apex, pinnules 1-1½ inch long horizontally patent in general opposite from a truncato-subcuneate sessile base contracted at the point of insertion (not adnate) oblong-ovate or oblong acuminate but obtuse pinnatifid about halfway down with oblong obtuse quite entire segments, veins pinnated in each segment with three or four pairs of veinlets, 1-6 sori on each lobe of the pinnules, rachis bright tawny or stramineous as well as the costæ which are winged above with a narrow margin and as well as the costules more or less villous with rather long scattered deciduous white soft hairs.

Hab. Bourbon, *Carmichael*. Mauritius, *Bojer*.—This is remarkable for the almost invariably opposite pinnæ and pinnules; in that respect somewhat resembling *P. procerum*, Brack. I have failed to find any published description that corresponds with it.

186. *P. (Phegopteris) sanctum*, Sw.; caudex small short erect or decumbent concealed by the copious radicles below and the tufted slender stipites above which are 1-3 inches long slender stramineous, fronds membranaceous 3 inches to nearly 1 foot long full green very minutely glandular beneath 1-2 inches wide lanceolate acuminate much attenuated at the base subbipinnate, pinnæ sessile rather distant especially the lower dwarfed ones oblong or linear-lanceolate generally pinnated at the base with the lowest pair much longer than the rest especially the superior one (so that the pinnæ are hastate) the rest pinnatifid, pinnules and segments linear or oblong obtuse pinnatifid with short lobes, veins simple or once or twice forked, sori dorsal very small forming a line or series between the costule and the margin.—*Sw. Syn. Fil. p. 39. Willd. Sp. Pl. v. p. 198. Acrostichum, Linn. Sp. Pl. p. 1526. Aspidium, Metten. Aspid. p. 76 Phegopteris, Fée. Pheg. tenella, Fée, Gen. Fil. p. 243, and 7me Mém. Foug. Nouv. p. 62. t. 25. f. 2 (small form).*

Hab. West Indies: Jamaica, *Sloane, Bancroft, M'Fadyen, Alex. Prior, Wilson*; Cuba, *Pæppig, Linden*, n. 1884, 1966, *C. Wright*, n. 814, 816, 885.—An elegant small Fern, remarkable for the long ear-like segments or pinnules at the base of the pinnæ, giving a hastate form to the latter. I have only seen specimens from Jamaica and Cuba; but it has probably been overlooked in other islands. I can find no trace of an involucre on any of my numerous fronds.

187. *P. (Phegopteris) glanduliferum*, Liebm.; "caudex small globose clothed with flesh-coloured (squamis carneis) scales, stipites 3-4 from the caudex 1-3 inches long, frond membranaceous on both sides glanduloso-punctate 4-8

inches long 1-3 inches broad lanceolate bipinnato-pinnatifid, primary pinnæ subopposite alternate above divergent subsessile rather remote lanceolate sharply acuminate, pinnules elongate inæquilateral, lowest ones sessile obliquely and acutely cuneate at the base adnate above decurrent at the inferior base deeply pinnatifid, upper ones gradually confluent, segments spreading rather remote, lowest ones obliquely ovate, the rest lanceolate rather obtuse at the apex, the margin adpressedly denticulate, sinuses arcuate acute, veins simple, sori on the middle of the back of the veins castaneous numerous, universal rachis plane in front and margined convex at the back clothed with lanceolate acute membranaceous hyaline carneous scales black at the base." *Liebm. Fil. Mex. p. 54.*

Hab. Oaxaca, *Liebmann*, alt. 2500 feet.—My specimens of this from the author, though fertile, are fragments without caudex, and without stipes. I do not, however, recognize it as belonging to any known species, and can only describe it in the author's own words.

188. P. (Phegopteris) *Mannianum*, Hook.; caudex short thick erect or oblique densely clothed with ovate long-pointed ferruginous scales, stipites tufted 6-9 lines long slender stramineous (as well as the rachis) flexuose deciduously paleaceous with rather sparse delicate lanceolate squarrose scales, fronds 6-10 inches long 2-4 inches wide ovato-lanceolate membranaceous glabrous bipinnate below, pinnated in the middle pinnatifid at the acuminate apex, pinnæ subsessile and nearly opposite distant, primary (lower) pinnæ  $2\frac{1}{2}$ -3 inches long  $\frac{3}{4}$ -1 inch wide from a broad base gradually but obtusely acuminate pinnated near their base, the rest pinnatifid, pinnules and segments ovate-oblong very obtuse lobato-pinnatifid, lobes subentire or generally with one or two distant teeth on the margin below the blunt apex, superior pinnæ resembling the inferior but the pinnæ are united by their decurrent and approximate bases, veins conspicuous pinnated, veinlets distant simple or once or twice forked bearing a sorus on the upper branch so as to form a lax series of sori halfway between the costule or primary vein and the margin.

Hab. Fernando Po, on the Peak, alt. 2000 feet, *G. Mann*.—A small species with no very marked character, having somewhat the habit of *Nephrodium* (*Lastrea*) *cristatum*, but very different in other respects.

189. P. (Phegopteris) *Barterianum*, Hook.; caudex small erect paleaceous, stipites tufted yellow-brown a span long

partially paleaceous below with lanceolato-acuminate scales, fronds 10–12 inches long firm-membranaceous deltoideo-ovate very minutely glandulose beneath and hairy, bipinnate below, the rest pinnate, pinnatifid at the long acuminate apex, pinnæ sessile or nearly so, lowest pair of pinnæ half-ovate (pinnules of the inferior side the longest), the rest from a broad base oblong much acuminate deeply almost to the rachis pinnatifid, uppermost ones entire confluent, all subfalcate, segments and ultimate pinnules oblong very slightly falcate obtuse entire or lobato-serrate often subauricled, veins pinnated, veinlets simple or forked, sori rather small in two rows nearer the costule or principal vein than to the margin, rachises and costæ with copious spreading white hairs.

Hab. Fernando Po, *Barter*.—Allied to *P. Mannianum*, but certainly very different in its larger size, differently shaped segments, the very hairy under-surface, and sharply acuminate apices to the pinnæ. The lowest pair of pinnæ have a little disposition to be bipinnate.

190. *P. (Phegopteris) Milnei*, Hook.; caudex long creeping (possibly scandent) densely clothed with close-pressed imbricated subpeltate linear subulate ciliated ferruginous scales black in the disk of their broad base, stipites very remote thick as a crow's-quill and as well as the main rachis dark castaneous-brown glabrous and scaleless subebeneous, fronds  $1\frac{1}{2}$ –2 feet and more long dark-green firm-membranaceous quite glabrous deltoid-ovate long acuminate, bipinnate below, the rest pinnate, lowest primary pair of pinnæ 8 inches long ovate acuminate sessile or nearly so, their pinnules  $1\frac{1}{2}$ –2 inches long oblong-lanceolate pinnatifid more or less deeply, the rest of the primary pinnæ 5–6 inches and more long 2 inches broad deeply almost to the rachis pinnatifid, the segments 1– $1\frac{1}{2}$  inch long  $\frac{1}{4}$  of an inch wide suberectopatent oblong-lanceolate obtuse lobato-pinnatifid, superior and shorter ones entire, veins copious rather distant twice or thrice or more forked, one or more veinlet bearing a sorus (often appearing quite terminal) and thus the sori form two rather irregular series nearer the margin than the costule.

Hab. Futuna, New Hebrides, *Milne*.—A very fine and, I think, quite distinct species, with unusually long segments.

191. *P. (Phegopteris) Hillebrandi*, Hook.; caudex?, stipes?, frond ample subcoriaceo-membranaceous very dark-green when dry (probably succulent when recent) glabrous mi-

nutely pellucido-glandulose beneath (the glands apparently in age forming copious minute appressed oblong spicules), bipinnate below, the rest pinnate, primary lower pinnæ 12-14 inches long 6 inches wide sessile broad-oblong acuminate pinnatifid at the acuminate apex, pinnules 3 inches long  $\frac{1}{2}$ - $\frac{3}{4}$  of an inch wide from a truncated base oblong-acuminate pinnatifid about halfway down with closely placed rounded obtuse or obliquely acute subentire lobes or segments, the rest of the primary pinnæ are from 6-8 inches long 1-2 inches wide oblong-acuminate deeply nearly to the costa pinnatifid, the segments often an inch long and  $\frac{1}{4}$  of an inch wide oblong obtuse lobato-serrate at the margin, a few of the lowest ones free (forming pinnules) and those more elongated and pinnatifid, veinlets simple or once or twice forked, sori often copious rather large in two rows near the margin, rachis and costæ obscurely hirsuto-paleaceous.

Hab. Honolulu, Sandwich Islands, *Dr. Hillebrand*, n. 42.—This is too striking a Fern to pass by unnoticed, yet I have not the materials for correctly describing the entire plant. It was named *P. procerum* by Dr. Hillebrand; but variable as that Fern no doubt is, this is certainly distinct. Sori all near the margin.

192. *P. (Phegopteris) pterioideum*, Kl.; caudex?, stipes 2-4 feet long very paleaceous towards the base with large ovato-lanceolate brown scales, fronds ample 2-3-11 (*Spruce*) feet long subpendulous or subscaudent chartaceous broad-lanceolate acuminate bipinnate 1-3 feet broad, pinnæ 6 inches to 1½ foot long 1-3 inches broad oblong acuminate in opposite remote pairs, pinnules also frequently in opposite rather distant horizontal pairs approximate and confluent upwards 1-1½ inch long 3-5 lines wide from a truncated sessile base linear-oblong acute or acuminate quite entire or crenato-serrate, lower ones often deflexed, veins simple in the smaller specimens forked in the larger ones all soriferous near the apex so as to form an intramarginal series very distant from the costule. (TAB. CCLXXX.)—*Kl. in Linnæa*, xx. p. 389 (not *Pol. pteroides*, *Pr.*). *Phegopteris*, *Metten. Phegopt.* p. 9.

Hab. Columbia, *Moritz*, n. 291. Ocaña, *Schlim*, n. 368. Venezuela, *Fendler*, n. 206. Omotepec, Central America?, *C. Wright*, in *Ringold and Rodgers*, *U. S. N. Pacif. Expl. Exp.* (from *Eaton*), sterile. Ecuador, Montaña de Canelos, "15-pedalis, stipite 4-pedali incluso, pendula vel inter ramos vicinos subvolubilis, pinnæ 40-paria," *Spruce*, n. 5260.—A very peculiar and most distinct species, and not apparently of any extensive geographical distribution.

\*\*\*\*\* *Tripinnate (rarely bipinnate), or variously decompound.* 193-223.

193. *P. (Phegopteris) davallioides*, Mett.; caudex slender suberect flexuose scaleless radican with wiry fibres terminated by a tuft of scaly stramineous stipites a span to a foot and more high, fronds 1-2 feet high ovate acuminate firm-membranaceous quadripinnate, primary secondary and tertiary pinnæ petiolate, ultimate ones ovate cuneate and subpetiolulate at the base about  $\frac{1}{4}$  of an inch long pinnatifid with few oblongo-obovate obtuse segments pinnate at the base, the ultimate pinnule broader than the segments and lobed, veins and simple or forked veinlets subflexuose terminating below the apex of a lobe and there bearing the rather small globose sorus.—*Monachosorum*, Kze. in *Schk. Fil. Suppl.* ii. p. 1. t. 101. *Polypod.*, Metten. *Polypod.* p. 32. *P. subdigitatum*, Bl. *Fil. Jav.* p. 196. t. 93. Metten. *Polypod.* p. 32. *Aspidium*, Bl. *Fil. Jav.* p. 171. Moore, *Index Fil.* p. 70. *Polypodium conifolium*, Wall. *Cat. n.* 326.— $\beta$ , *angustilobum*; fronds very black when dry, ultimate lobes or segments narrow or acute.

Hab. Nepal, Wallich, 1821. Sikkim, 7000-8000 feet, Hook. *fil. et Thomson*. Boutan, Thos. Lobb. Malay Islands, in the mountains, 3000-7000 feet of alt.: Java, Blume, Thos. Lobb. Malay Peninsula, Sir W. Norris.— $\beta$ . Kina Balou, Borneo, alt. 6000 feet, Low.—I have no means of determining which of the two authors who have described this Fern has the right of priority in regard to specific name, Blume or Kunze; but it is certain the plant was first known to Dr. Wallich, who largely distributed it under the name of *Polypod. conifolium*, but which I do not find adopted by any one. On some of that gentleman's original specimens from Nepal, on Dr. Hooker's from Sikkim, and on those from Sir W. Norris, are clusters of tuberiform excrescences in the axils of the primary pinnæ, three or four together of what may be gemmæ or viviparous buds, or, possibly, fungi, as large as a good-sized pea, but oval in shape, rusty colour externally from a downy covering, hard (when dry); internally is a dark pulverulent mass.

194. *P. (Phegopteris) dareæforme*, Hook.; caudex thickish creeping densely ferrugineo-paleaceous with lanceolate much acuminate scales, stipes 4 inches long glossy pale-chestnut coloured, frond a span long ovato-deltoid submembranaceous bipinnate, primary pinnæ 4-5 inches long  $1\frac{1}{2}$  inch wide oblong-lanceolate subsessile acuminate subpinnatifid, segments linear or subspathulate obtuse simple or bifid, veinlets solitary in each segment clavate terminating below the apex bearing a sorus generally much below the clavate apex, capsules very few in each sorus.—Hook. *2d Cent. of Ferns*, t. 24.

Hab. Khasya Hills, Simons, n. 98.—This has some affinity with *Pol. davallioides*, but is much smaller, and the caudex and the segments of the pinnules are very different.

195. *P. (Phegopteris) asperulum*, J. Sm.; caudex?, stipes (a small portion of it) terete brown glanduloso-pubescent as is the whole frond especially beneath and on the slightly (but distinctly) winged rachises, frond  $1\frac{1}{2}$  foot and probably more long 12-14 inches wide in the broadest part subcoriaceous-membranaceous brown-green subdeltoid-ovate acuminate bisubtripinnate, primary pinnæ petiolate 6-8-9 inches long  $\frac{3}{4}$ -2 inches wide patent petiolate distant oblong-acuminate, secondary pinnæ rather wide apart petiolate subfalcate oblique lanceolate (superior half the broadest) obtuse, those of the lowest primary pinnæ again pinnate at their base only, superior basal pinnule always the largest forming an auricle, the rest more or less deeply pinnatifid, pinnules and ultimate segments oval-oblong obtuse crenato-serrate most so on the superior margin, veins twice or thrice forked, sori 4-6 on a pinnule or segment, each corresponding to a serrature.—*J. Sm. in Hook. Journ. Bot.* iii. p. 394 (name only, and a scarcely applicable one).

Hab. Luzon, *Cuming*, n. 63.—A very distinct species; allied, however, to *P. Hasseltii*, Bl., in habit, and pubescence, and ramification; but very different in the shape of the pinnules, and having the secondary pinnæ pinnatifid, rather than again pinnate.

196. *P. (Phegopteris) Hasseltii*, Bl.; "caudex oblique, stipes 9 inches long sparingly paleaceous, fronds coriaceous opaque-green glabrous 1 foot long triangular-ovate acuminate subquadripinnate, lowest (primary) segments subopposite 6 inches long petiolate unequally triangulari-ovate, secondary ones  $1\frac{1}{2}$  inch long petiolate ovate, basal ones of the inferior side larger 3 inches long, tertiary inferior ones ovato-oblong obtuse deeply pinnatifid at the base, superior ones confluent by a very narrow wing from a cuneate inferior base, and uppermost one obliquely truncate trapezo-ovate obtuse the superior base pinnatifid the apex crenate or entire, basal segments obovato-oblong obtuse having pinnated veins, superior ones ovate confluent with forked veins which are soriiferous at the superior base, sori intramarginal." *Metten.—Bl. Fil. Jav.* p. 195. t. 92. *Phegopteris*, *Metten. Phegopt.* p. 13. *Polypod. anisopteron*, *Kze. Bot. Zeit.* vi. p. 118 (*fide Metten.*).

Hab. Java, "*Blume*," "*Zollinger*," n. 1466.—I am unacquainted with this, except through *Blume's* figure and description.

197. *P. (Phegopteris) rufescens*, Bl.; "fronds tripinnatifid

subcoriaceous puberulous on the costa on both sides and on the rachis and stipes, lower pinnules petiolate oblong-lanceolate cuneate at the base and deeply pinnatifid, segments and superior (adnate) pinnules oblong obtuse crenulate." *Bl. Fil. Jav. p.* 194. *t.* 91. *Metten. Phegopt. p.* 13. *Aspidium, Bl. Fil. Jav. p.* 168.

Hab. Java, *Blume*.—Unknown to me, as it appears to be also to Mettenius. The figure has a good deal the general aspect of *Aspidium coriaceum*.

198. *P. (Phegopteris) sericeum*, Hook.; "caudex creeping paleaceous, stipes slender and together with the fronds sericeo-hirsute, fronds subpellucid ovate acuminate bipinnate at the base pinnatifid towards the apex, lowest pinnæ opposite inæquilateral ovate, lateral pinnules on the lower side larger elongated pinnatifid, on the superior side smaller scarcely incised, superior pinnæ oblongo-ovate pinnatifid, the segments obliquely ovate obtuse larger on the superior side, veins on the costule pinnated free simple or forked, sori on the back of the veins near the costule, capsules mixed with pellucid articulated very long hairs." *Phegopteris, Eat. in Fil. Wright. et Fendl. p.* 208.

Hab. Cuba, *C. Wright, n.* 1054.—"Caudex thick as a crow's quill, scaly. Stipes nearly a foot long, slender, sericeo-pubescent. Fronds  $\frac{1}{2}$  a foot long, 3-4 (and more) inches wide, deltoideo-ovate, silky on both sides with whitish articulated hairs." *Eat.*—Mr. Eaton justly says of this, "*Filix pulchella a ceteris Phegopteridis speciebus plane diversa.*" The oblique inæquilateral pinnules give the plant a somewhat polystichoid character.

199. *P. (Phegopteris) splendidum*, Klfs.; caudex?, stipes in one of our specimens 2 feet and more long thick as a goose-quill furrowed and glabrous, frond ample 4-5 feet long coriaceous-membranaceous opaque glabrous or hirsutulous on the veins bipinnate in the more mature state pinnatifid at the apex (rarely only pinnate with the pinnæ pinnatifid), primary pinnæ 1-1 $\frac{1}{2}$  foot long, lower ones petioled 3-6-7 inches wide oblong-ovate acuminate copiously pinnate pinnatifid towards the apex, pinnules more or less distant 2-2 $\frac{1}{2}$  inches long  $\frac{1}{2}$ - $\frac{3}{4}$  inch wide sessile towards the base, upper ones more or less adnate pinnatifid halfway down to the costa with ovate obtuse lobes, superior primary pinnæ often 8-10 inches long 2 inches and more broad deeply more than halfway down to the costa pinnatifid with broad-oblong falcate entire segments, veins immersed (not in the least prominent but conspicuous when seen between the eye and the light) pinnated with rather numerous veinlets many of them

soriferous on the back near the middle, sori small distant forming a single series between the primary vein (or costule) and the margin.—*Kaulf. En. Fil. p. 112. Phegopt., Fée. Metten. Phegopt. p. 28. Polyp. formosum, Raddi, Fil. Bras. p. 25. t. 38. P. repandum, Arrab. and Kze. (fide Metten.). P. macropterum, Klfs. l. c. p. 112 (the pinnato-pinnatifid form).*

Hab. Brazil, abundant, *Martius, Gardner, n. 17, 134, 5918, Moricand, n. 2469.*—Remarkable for the large size and variable form of the primary pinnæ.

200. *P. (Phegopteris) spectabile, Kaulf.;* “caudex erect, fronds ample 4–6 feet long rigid-membranaceous on both sides especially on the costæ and on the stipes setaceo-paleaceous and pubescent deltoideo-ovate tripinnate below, primary segments ovate acuminate, secondary ones oblong-lanceolate acuminate, those of the inferior side 5–7 lines, of the superior side 4 lines long, tertiary ones linear-oblong obtuse, lowest ones free at the base pinnatifid with oblong segments their apex obliquely truncato-rotundate most of them with the lowest segments coadunate and decurrent pinnatifid or entire, tertiary veins forked soriferous on the anterior branch, sori near the margin of the segments globose, capsules glabrous numerous densely compacted.” *Metten.—Kaulf. En. Fil. p. 121. Phegopteris, Fée, Gen. Fil. p. 243. Metten. Fil. Hort. Lips. p. 83. t. 17. f. 10 (fragment with sori), and Phegopt. p. 30. Polypod. inæquale, Link., and P. vastum, Kze. in Linnæa, ix. p. 50 (fide Metten.).*

Hab. “West Indies, *Bory, Sieber. Caraccas, Karsten, n. 385, 389, Moritz, n. 202. Venezuela, Funck and Schlim, n. 407, 412, 282, 1575. Peru, Pæppig. Chili, Lechler, Pæppig.*” *Metten. Ecuador, Tunguragua (without number), Spruce.*—The present and not a few of the following species of authors are very puzzling to me. The one now under consideration appears to have an extensive range in South America, from the Atlantic to the Pacific Ocean. It was first described from a Chilian specimen of Chamisso.\*

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\* Closely allied to *P. spectabile*, in general habit, form, and ramification, is the following Nephrodiaceous plant, my specimens of which, in consequence of my overlooking the involucre, I had placed in my herbarium with *Phegopteris*. It should have been inserted at p. 125 of this volume, next after sp. 125 (*N. villosum*).

125 *bis.* *Nephrodium (Lastrea) catocarpum, Hook.;* “stipes at the base densely clothed with flaccid lanceolate long acuminate scales, upwards together with the ramifications and the costæ (more densely beneath) paleaceous with lanceolate acuminato-setose appressed scales, fronds rigid-membranaceous ample above (costæ excepted) glabrous somewhat glossy beneath 2–3 feet long deltoideo-ovate acuminate tripinnate, primary segments approximate imbricated patent curved upwards long-petioled ovato-oblong or oblong obtuse, superior ones with the inferior base decurrent oblong obtuse, tertiary ones approximate oblong



201. *P. (Phegopteris) subincisum*, Willd.; "caudex arbo-reous, fronds subtripinnato-partite, stipes and rachises and the veins above fusco-strigillose with subulate scales, pinnæ and pinnules linear-oblong acuminate, segments linear-oblong obtuse crenato-pinnatifid crenate sinuato-dentate or subentire, sori (upon a vein or upon a veinlet of a forked vein) on the entire segment (of the inferior portion of the frond) 10-12, one to each of the teeth or lobule of the pinnule." *Mart.—Willd. Sp. Pl. v. p. 202. Mart. Crypt. Bras. p. 89. t. 64. Phegopteris, Fée, Gen. Fil. p. 243. Metten. Phegopt. p. 30. Alsophila Martinicensis, Sieb. Syn. Fil. n. 162. Hook. Sp. Fil. i. p. 48.*

Hab. Martinique, *Sieber*. Brazil, *Martius*.—This had been placed by Sprengel, Sieber, and others, in *Alsophila*, among Cyatheaceous plants; but it is probably more correctly referred to *Polypodium*. I am obliged to have recourse to what I am disposed to consider a good authority for this species, especially as it is accompanied by a fine figure; but I confess myself unable to distinguish this from my specimens of the preceding one.

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obtuse, inferior attenuated at the base adnate pinnatifid, superior ones confluent obtuse crenate, lobes approximate oblong subfalcate or at the apex obliquely obtuse, branches of the pinnated veins undivided each soriferous, sori of moderate size, involucre reniform with the margin i. flexed repando-ciliate rigidly membranaceous persistent at length reddish." *Metten.—Kze. in Linnæa, ix. p. 95. Metten. Aspid. p. 73. Eat. in Fil. Wright. et Fendl. p. 209. Aspid. nemophilum, Kze. l. c. (fide Metten.). Lastrea, Moore.*

Hab. Peru, "*Pæppig*. Caraccas, *Moritz, Linden*." Venezuela, *Fendler, n. 204*.

I discover another Lastreoid Fern among my *Phegopteris*-section, referred thither by the acute Mr. Spruce as well as myself, which I may here introduce:—

125 *ter. Nephrodium (Lastrea) Palatanganum*, Hook.; stipes thick as a duck's quill a span or more long rufous-brown at the base densely clothed with very slender silky ferruginous hairlike scales 1-1½ inch long, upwards together with the rather stout rachises and costæ clothed with rather small but copious erect or appressed linear-lanceolate dark scales pale-brown at the margin often mixed with broader and ciliated ones, frond firm-membranaceous tripinnate probably ample, our solitary specimen has two pairs of distantly placed pinnæ (the pairs 6 inches apart nearly opposite) a foot long 6 inches broad ovate-acuminate petioled slightly falcate with an upward curvature, on both sides beset with minute glittering pellucid glands, obscurely hairy on the veins, secondary pinnules subpetiolulate numerous very closely placed (mostly overlapping each other with their margins) 2-3 inches long 1 inch wide in the broadest part from a broad subtruncated base oblong obtusely acuminate, pinnules also all close-placed ¾-1 an inch long 2-3 lines wide sessile oblong obtuse straight or slightly falcate, pinnatifid nearly halfway down with ovate obtuse always entire lobes, those of the apex alone entire and coadunate, veins usually forked in each lobe the upper branch bearing a pale coloured sorus of lax capsules near the base, involucre very thin and membranaceous cordate glanduloso-ciliate soon deciduous.

Hab. Palatangana, Andes of Ecuador, *Spruce, n. 5256*.—This appears to me to be a new and very distinct species of the *Lastrea*-group of *Nephrodium*, but very difficult of definition, as are so many of the decompound Ferns.

202. *P. (Phegopteris) Karstenianum*, Kl.; "caudex erect and together with the base of the stipes (2 feet long) densely paleaceous with long (1-1½ inch) membranaceous ferrugineofuscos lanceolate acuminate finely serrulated scales, fronds ample ovate acuminate on both sides and on the ramifications of the stipes above sparsely and rigidly beneath densely soft cano-hirsute tripinnate, lower primary inferior pinnæ ovate acuminate, secondary ones petiolate oblong-lanceolate acuminate, tertiary ones oblong obtuse or acuminate pinnatifid, all or most of them adnate and decurrent at the inferior base, segments oblong obtuse, veins undivided, sori intermediate between the costule and the margin, capsules lax." *Metten.*—*Polypodium*, Kl. in *Linnaea*, xx. p. 390. *Phegopteris*, *Metten. Phegopt.* p. 30. *Eat. in Fil. Wright. et Fendl.* p. 208. "*Pheg. hirsuta*, *Fée, Gen. Fil.* p. 248?"

Hab. Columbia, *Moritz*, n. 454. Venezuela, *Funck and Schlim*, n. 975 (*Metten.*), *Fendler*, n. 447. Ecuador, alt. 7000 feet, *Spruce*, n. 5257 and 5257 A.—This Fern attains a considerable size. My specimens from Spruce precisely accord with authentic ones from Klotzsch and from Fendler. Of Spruce's specimens, the stipes is at the base as thick as one's thumb, densely clothed with long narrow crisped scales; the entire stipes is 4-5 feet long; the frond 4 feet long; the ultimate pinnæ (often slightly coadunate at the base) are ¾-1 of an inch long, crenato-pinnatifid rather than pinnatifid. Still the species is not to me satisfactorily defined.

203. *P. (Phegopteris) connexum*, Klfs.; "stipes 1 foot long paleaceo-pilose at length naked, frond membranaceous tender, beneath on the costæ and costules densely pubescenti-hirsute 1½-2 feet long oblong acuminate, at the base only or throughout bipinnate, primary segments 8-9 inches long petiolate, basal ones ovato-lanceolate, superior ones oblong-lanceolate acuminate, secondary ones 1-2 inches long oblong or elongato-oblong acuminate or obtuse deeply pinnatipartite or pinnatifidly crenate, basal ones sessile, lateral ones dilated below, superior ones adnate at length coadunate by the inferior decurrent base, segments oblong obtuse, veins with pinnated undivided branches, the tertiary ones soriferous." *Metten.*—*Polypodium*, *Kaulf. En.* p. 120. *Mart. Crypt. Bras.* p. 90. t. 65. *Phegopteris*, *Fée, Metten. Phegopt.* p. 29.

Hab. Brazil, *Martius*, *Moricand*, n. 2191 and 2469, *Spruce*? (without number).—I possess authentic specimens from Moricand, according to Mettenius, but they do not satisfy me that the species is a very distinct one.

204. *P. (Phegopteris) paleaceum*, Anderss., an Hook. fil.?; "frond broadly ovato-oval tripinnate, primary and secondary

pinnæ alternate subapproximate, primary triangular, secondary broadly linear attenuated at the apex curved, pinnules incised or nearly entire, segments generally obtuse nearly glabrous on both sides finely ciliated, the collum (base of stipes?) and rachis densely paleaceous with lanceolato-linear acute long and soft rufescent erect scales."—*Anderss. En. Pl. Galap. (in Kongl. Svensk. Fregat. Eugen. Resa Omkr. Jord, Bot.) part 11. p. 38. Hook. fil. En. Pl. Galap. (in Linn. Trans. xx.) p. 166?*

Hab. Summit of the mountain, Charles Island, Galapagos, *Andersson, Darwin?*—My only specimen of this is from Dr. Andersson, who, as myself, is doubtful if it be identical with the *P. paleaceum*, Hook. fil. I may here observe that neither has Dr. Andersson nor myself had access to the *new Ferns* described by Dr. Hooker, l. c., and the specimens were not so good as could be wished: so that Dr. Hooker is satisfied that much reliance cannot be placed on his brief characters. *Polypod. (Phegopt.) pleiosorus*, Hook. fil. l. c., is thus circumstanced, of which only the apex of apparently a very large frond was preserved; hence that species is here omitted.

205. *P. (Phegopteris) punctatum*, Spruce; caudex?, stipes 2–3 feet and more long thick as one's little finger glossy brown in the lower half densely coarsely long black setos-squamose (the same setiform scales are seen upon the rachis and at the base of the costæ but they appear to be soon deciduous), frond very ample 5–6 feet and more long firm-membranaceous dark bright green pellucido-punctate glabrous below bipinnate, primary pinnæ subopposite petioled 1–2 feet long 5–8 inches wide ovato-oblong acuminate pinnated pinnatifid at the apex with copious horizontal sessile oblong-lanceolate very numerous pinnæ pinnatifid nearly halfway to the rachis, lobes ovate obtuse entire, intermediate primary pinnæ of the frond equally long but narrower and deeply nearly to the costa pinnatifid with spreading linear-lanceolate segments 1–1½ inch long ¼ inch wide sharply inciso-pinnatifid a few only of the basal ones free but decurrent, apex of the frond pinnatifid with segments as just described, veins and veinlets pellucid, the latter mostly simple bearing a dark-brown sorus on the back, one to each of the lesser lobes, lobes or segments of the pinnules 3–5 on the larger ones.—*P. punctatum*, *Spruce, mst.*

Hab. Tarapota, Eastern Peru, *Spruce, n. 4719*, and foot of Chimborazo, Ecuador, in woods, alt. 3000 feet.—A very fine and distinct species, of which Mr. Spruce says, "*Filix pulcherrima cæspitosa, 9-pedalis.*"

206. *P. (Phegopteris) canescens*, Kze. Herb.; "caudex?",

stipes  $1\frac{1}{2}$  foot long densely clothed at the base with blackish coriaceous subulate serrated scales 6 lines long, fronds membranaceous, on both sides cano-pubescently villosulous 2 feet long ovate acuminate tripinnate at the base, primary segments ovate acuminate, secondary ones shortly petiolate oblong-lanceolate acuminate dilated at the inferior side, tertiary or superior secondary ones adnate with the decurrent inferior base oblong or elongato-oblong obtuse or acute pinnatifid or pinnatipartite, the lobes oblong rotundato-obtuse entire, veins undivided, sori intermediate between the costule and the margin, capsules lax."—Phegopteris, *Metten. Phegopt.* p. 30.

Hab. "Bahia, Brazil, *Moricand*, n. 2454.—Distinguished from its affinities by the form of the scales." *Metten.*

207. P. ? (Phegopteris) *Sloanei*, Kze.; stipes  $2\frac{1}{2}$  feet and more long rufous-brown (and as well as the rachis) subpaleaceous or quite glabrous, the base for 4–5 inches most densely clothed with beautiful long flexuose silky ferruginous tow, rather than scales, the hairs often more than an inch long resembling those on the stipes of *Woodwardia radicans*, frond firm-membranaceous ample 3–4 feet and more long 2 feet and more broad tripinnate, primary pinnæ often a foot long broad ovate-oblong acuminate, ultimate pinnæ or pinnales sessile 2–4 inches long oblong-acuminate deeply almost to the rachis pinnatifid, segments oblong subobtuse entire or crenate or more generally again more or less deeply pinnatifid, veinlets usually forked, one to each tooth or lobule the upper branch bearing the sorus, sori forming two series intermediate between the costule and the margin large in an old state small when young and then (according to Mettenius) exhibiting a minute hairy lastreoid indusium.—*Kze. in Linnæa*, ix. p. 51, and xviii. p. 322. P. amplum, *H. B. K. in Willd. Sp. Pl.* v. p. 207? *Aspid.*, *Metten. Aspid.* p. 74? (not *Eat. Fil. Wright. et Fendl.* p. 209). Polypod. lachnopolidium, *J. Sm.*

Hab. Cuba, *Pæppig* (from *Kze. in Herb. nostr.*). Abundant in Jamaica, *Wilson, Purdie, March*, n. 161, *Prior*. St. Vincent, *L. Guilding*. Dominica, *Imray*. Trinidad, *De Shack*. Volcan de Fuego, alt. 7000 feet, Guatemala, *Salwyn*.—This is a very abundant plant in Jamaica, and may well be honoured with the name of *Sloanei*; but the figure of *Sloane* quoted by Mettenius can surely have nothing to do with it, and I am doubtful of most of the synonyms adduced by the latter author; I am not even sure that our plant is his *Aspid. amplum*, though it is probable our plant may be an *Aspidaceous* one. It is certainly not identical with the *Aspid. amplum* of *Eaton*, n. 1055 (which is acknowledged by Mettenius to be the

same as his). Similar as the fronds of the two may be in structure, the stipites in Eaton's plant are dark brown and tubercled, and the scales are dark chestnut, very large, and lanceolate, long-acuminate. The most distinctive of this species is the beautiful dense and long stupose silky clothing of the base of the stipites.\*

208. *P. (Phegopteris) honestum*, Kze.; "frond lanceolate pinnato-pinnatifid, pinnatifid at the apex, pinnæ lanceolate subfalcate acuminate shortly petiolate, lowest ones remote, segments oblongo-falcate obtuse subrepand and ciliated at the margin, stipites rachis and costæ patent-paleaceous beneath, sori uniseriate near the margin." *Kze. in Linnaea*, ix. p. 49. *Phegopteris*, *Metten. Phegopt.* p. 28.

Hab. Pampayaco, Peru, *Pæppig, in Herb. nostr., from Kze.*—A rather obscure plant. My only specimen of this is an original one from Kunze. It has very much the structure of *P. spectabile*, and still more perhaps with our *Pol. Sloanei*, but I do not know if it has the very villous silky scales of the latter species. The "venæ inferiores repetito-furcatæ" of Mettenius do not accord with our plant from Kunze, so that perhaps Mettenius had a different species in view. It is recorded only as a Peruvian plant.

209. *P. (Phegopteris) dilatatum*, Liebm.; "stipes  $1\frac{1}{2}$  foot long, frond herbaceous ample 3–4 feet long broad-lanceolate supradecomposed quadripinnato-pinnatifid, primary pinnæ alternate remote petiolate, secondary alternate petiolate lanceolate acuminate acute, tertiary ones alternate short-petiolate inæquilateral about  $1\frac{1}{2}$  inch long  $\frac{1}{2}$ – $\frac{3}{4}$  of an inch wide lanceolate acute, quaternary ones sessile alternate, lowest

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\* I take the opportunity of here introducing the *Aspidium (Lastrea) amplum* of Eaton, which should have been given immediately after our *Nephrodium (Lastrea) catopterum*, p. 137 of this volume.

130 bis. *Nephrodium (Lastrea) amplum*, Hook.; caudex?, stipes  $1\frac{1}{2}$  foot long tawny-brown thick as a duck's quill obscurely tubercled and bearing sparse subulate small patent scales (which are continued on the rachises), the base densely clothed with long ( $1$ – $1\frac{1}{2}$  inch) dark-brown glossy lanceolate long-acuminate scales, frond 3 feet and probably more long deltoid-ovate submembranaceous laxly tripinnate, primary pinnæ distant, lowest ones a foot long and bipinnate broad-oblong, secondary ones 2–3 inches long sessile deeply nearly to the rachis pinnatifid, segments and the ultimate pinnæ or pinnules of the lower primary pinnæ oblong acute entire or more or less deeply pinnatifid from  $\frac{1}{2}$ –1 inch long, veinlets simple subpellucid one to each lobe or lobule, sori rather small while young evidently furnished with a small cordate slightly hairy or ciliated membranaceous involucre.—*Aspidium amplum*, *Metten. Aspid.* p. 74 (an *Polyp. amplum*, *H. B. K. in Willd. Sp. Pl. v. p. 207?*). *Eat. Fil. Wright. et Fendl.* p. 209 (*vide Metten.*).

Hab. Caripe, Venezuela (if the plant of Willdenow), Cuba, *C. Wright*, n. 1055. *Dominica, Dr. Inray*, n. 56 (as far as can be judged by the frond).—I derive the above character from Mr. Wright's Cuban specimen. I dare not introduce the several synonyms referred to by Mettenius, which may or may not belong to the same plant. The scales of the base of the stipes here are quite different from those of our *Polyp. ? Sloanei*.

ones cuneate on both sides, at the base adnate above gradually confluent, all alato-decurrent obliquely ovate or elongato-ovate acute pinnatifid, the segments falcato-lanceolate acute thickened at the margin and a little revolute obsoletely subrepand, sinuses narrow acute, colour green on both sides, veins simple or forked, sori on the middle of the veinlets cinnamon-coloured solitary on each segment, costa a little prominent on both sides glabrous, quaternary rachises prominent on both sides cinnamomeo-pubescent winged, tertiary secondary and main rachises stramineous glossy grooved in front, the furrow cinnamon-puberulous margined convex on the back and glabrous, stipes bisulcate glabrous." *Liebm. Fil. Mex. p. 56. Metten. Phegopt. p. 14.*

Hab. Mexico, *Liebmann*.—This Fern, of which I possess an authentic specimen from Liebmann, the author compares to *P. divergens* and *effusum*. It appears distinct, and is perhaps more nearly allied to *P. Sloanei*. I possess what appear to correspond with it from Guadeloupe (*L'Herminier*), from Jamaica and St. Vincent, from Brazil, Guatemala, and Guayaquil.

210. *P. (Phegopteris) divergens*, Sw.; caudex tortuose creeping, stipites approximate 1–2 and more feet long sparsely paleaceous below with narrow subulate scales, fronds ample bright-green 1–3–4 feet long firm-membranaceous deltoid-ovate acuminate sometimes gemmiferous tri-quadrupinnate, primary lower pinnæ 1–1½ foot long petiolate unequally ovate (lower half the broadest) acuminate, secondary pinnæ of these and the primary superior pinnæ 6–8 inches long, tertiary and ultimate pinnæ (or pinnules) 1–2 inches long unequally ovate or lanceolate very acute decurrent at the unequally cuneate base serrato-pinnatifid with very acute subaristate segments, the rachis winged, veinlets simple or once or twice forked according to the breadth of the pinnules, sori rather distant forming a series between the costule at the margin generally one corresponding with each tooth or lobe, rachises and costæ pubescent.—*α, macrophyllum*; frond usually tripartite with broad pinnules. *Pol. divergens*, Sw. *Syn. Fil. p. 73. Willd. Sp. Pl. v. p. 209. Schk. Fil. p. 26 b.* *Phegopteris*, Fée. *Metten. Phegopt. p. 14 (including var. microphyllum).* *Polyp. multifidum*, Jacq.  *Ic. Pl. Rar. t. 643 (excellent).*—*β, microphyllum*; frond quadripartite, pinnules smaller and narrower. *Pol. effusum*, Sw. *Fl. Ind. Occ. iii. p. 1690. Syn. Fil. p. 41. Willd. Sp. Pl. v. p. 208. Schk. Fil. p. 27. t. 26 c.* *Phegopteris*, Fée.

Hab. Tropical America, both *α* and *β* frequent. Var. *α*. Brazil, *Gardner, n.*

120, *Brackenridge*, n. 31. Peru, *Mathews*, n. 1830. Venezuela, *Fendler*, n. 205.—Var. *β*. Jamaica, frequent, Cuba, *C. Wright*, n. 831. Ecuador, *Spruce* (no number).—The two forms, which by some are considered distinct species, present many intermediate states. Both are fairly represented by Schkuhr.

211. *P. (Phegopteris) pallidum*, Brack.; “cæspitose, stipites scabrous paleaceous, frond ample tripinnate, pinnules linear-oblong obtuse adnate decurrent, lower ones pinnatifid, superior ones crenate, segments ovato-oblong obtuse recurved at the margin toothed at the apex, rachis costa and veins paleaceo-hirsute, veins dichotomous, sori small numerous near the margin.” *Brack. Fil. U. S. Expl. Exp. p. 18*. *Nephrodium* (*Lastrea*) *tenericaule*, *Hook. supra*, p. 142 (*at least as concerns the locality of the Society Islands*).

Hab. Tahiti, Society Islands, *Brackenridge*, *Bidwill*, *Nightingale*.—I fear this will not prove distinct from the very variable *Polyp. tenericaule*, Wall. (now generally referred to *Lastrea*). It is certainly the same as *Nightingale's* and *Bidwill's* plants, which I had no hesitation in placing under that species at p. 142 of this volume.

212. *P. (Phegopteris) nemorale*, Brack.; “cæspitose, stipites glabrous terete paleaceous at the base, fronds lax bipinnate, pinnæ ascending, lower ones distant, pinnules oblong-lanceolate attenuate sessile decurrent, upwards deeply pinnatifid, segments linear obtuse serrated, rachis pubescent on the upper side, costa and forked veins villous on both sides, sori small solitary at the base of the teeth.” *Brack. Fil. U. S. Expl. Exp. p. 16*.

Hab. Tahiti, Society Islands, and Tutuila, Samoan Islands, *Brackenridge*; Island of Otaroha, *Cuming*, n. 140 and 1417.—My specimens from *Cuming* (noticed at p. 143 of this volume, referred to *N. (Lastrea) tenuicaule*) are identical with a fine specimen I have received from *Brackenridge*: but I must confess that, except in the more lax and membranaceous fronds, I do not see how it differs from the preceding, *P. pallidum*.

213. *P. (Phegopteris) crinale*, *Hook. et Arn.*; “plant from 4–6 feet high, caudex tufted, stipites tufted thick sulcated densely paleaceous,” fronds quite coriaceous rigid bi-tripinnate, pinnæ all horizontally patent, primary ones probably a span and more long, lowest ones semiovate (broadest on the inferior half), their lowest pinnæ again pinnate, the secondary pinnæ oblong deeply almost to the costa pinnatifid obtuse, segments and ultimate pinnules  $\frac{1}{3}$  of an inch long oval or oblong entire or crenato-lobate very obtuse, veinlets once or twice forked in the upper portion of the plant one or two veinlets only bearing sori at the superior base of the seg-

ment, "as many as six sori on the inferior segments," all the rachises rough and copiously setose with almost black flexuose subulate scales. *Hook. et Arn. Bot. of Beech. Voy. p. 105. Brack. Fil. U. S. Expl. Exp. p. 16.*

Hab. Hawaii. Forests in the Sandwich Islands, *Beechey, Brackenridge*.—This very distinct Fern was recognized by Dr. Arnott and myself as a new species from the fragments of a specimen, and I have only received two lesser fragments from my valued Hawaiian correspondent, Dr. Hillebrand. From Brackenridge's work, however, I have been able to improve the specific character.

214. *P. (Phegopteris) unidentatum*, Hook. et Arn.; caudex apparently subrepent short, stipes  $1\frac{1}{2}$  foot long stramineous subscabrous subpaleaceous the very base clothed with long (almost 1 inch) dark-brown glossy scales, frond  $1\frac{1}{2}$ –2 feet and more long firm-membranaceous deltoideo-ovate acuminate glabrous bi- below tripinnate, lowest primary pinnæ subopposite 8–10 inches long half-ovate much acuminate, those near the middle 4–5 inches long, secondary pinnæ  $1\frac{1}{2}$ –2 inches long (lower ones especially) sessile oblong acute or subobtuse rarely acuminate more or less deeply pinnatifid, segments oblong obtuse serrated chiefly towards the apex, teeth subspinulose and often one tooth or serrature is larger than the rest, veinlets once (or at the base of the pinnule twice) forked, sori solitary marginal at the base of sinus, rachises stramineous glabrous. *Hook. et Arn. Bot. of Beech. Voy. p. 105. Brack. Fil. U. S. Expl. Exp. p. 17.*

Hab. Sandwich Islands, Oahu, *Beechey, Brackenridge*, Hawaii, *Dr. Hillebrand*.—This also was first described from fragments of specimens. I have received perfect ones from Dr. Hillebrand, showing that the base of the stipes is densely paleaceous, and the sori invariably close to the margin, at the base of a sinus of the segments or of the lobules.

215. *P. (Phegopteris) Sandvicense*, Hook. et Arn.; caudex ?, stipes (upper portion only seen) and rachises and costæ beneath castaneous more or less furfuraceo-paleaceous, frond membranaceous deltoid-ovate 2–4 feet or more long bipinnate tripinnate below, lower primary pinnæ often a foot long all of them broad ovato-oblong acuminate, pinnules sessile 1–2 inches long  $\frac{1}{2}$ – $\frac{3}{4}$  of an inch wide subovato-oblong obtuse or shortly acuminate deeply pinnatifid almost to the rachis (less so in those of the upper portion of the frond), segments oblong obtuse subpinnatifid or crenato-dentate, veinlets forked, sori 1–3 on a segment nearer the margin than the costule. *Hook. et Arn. Bot. of Beech. Voy. p. 105. Brack. Fil. U. S. Expl. Exp. p. 17.*



Hab. Sandwich Islands, *Beechey* (frond and upper portion of stipes quite glabrous and scaleless), *Brackenridge*. Society Islands, *Bidwill* (glabrous, and with the pinnules falcate and less deeply pinnatifid). Pitcairn's Island, *Cuming*, n. 1388. Otaheite, *Cuming*, n. 1414. Ovalau, Fiji Islands, *Milne*, n. 303.—Brackenridge (who does not appear to be acquainted with the perfect stipes) observes that "the whole plant has a good deal the habit of *P. unidentatum*, but is withal distinct." He may possibly have another plant in view, for he says the ultimate divisions are pellucido-punctate. Truly, however, more perfect, and suites of specimens are required of these large-fronded decomposed *Polypodia* before the correct limits of the species can be defined.

216. *P. (Phegopteris) Aneitense*, Hook.; caudex?, upper portion of stipes and primary and slender secondary rachises pale-brown glabrous and scaleless, frond membranaceous bright-green 18–20 inches long 12–14 inches broad at the base subdelteo-ovate acuminate bipinnate tripinnate below, primary pinnæ 6–8 inches long 2–3 inches broad distant, all petiolate broad-oblong acuminate, secondary pinnæ all petiolate distant  $\frac{1}{2}$ –1 inch long from a broad obliquely cuneate base ovate more or less acuminate deeply pinnatifid especially on the superior half, segments oblong or subovate, lowest superior one generally the largest and forming an auricle, entire or subpinnatifid, superior ones entire or with a strong spinelike tooth at its inner margin, ultimate pinnæ or pinnules resembling these but smaller, veinlets once or twice forked one to each segment bearing a solitary sorus on the lower superior branch distant from the margin and always terminal on the veinlet, secondary rachises with a narrow green marginal wing.

Hab. Aneiteum, one of the New Hebrides, *Milne and Macgillivray*.—This has a very peculiar aspect, and seems quite a new species; the greater number of the segments or lobes are furnished with a solitary strong spinelike tooth in the inner margin, and the species certainly merits the name of *unidentatum* rather than the preceding one.

217. *P. (Phegopteris) Keraudrenianum*, Gaud.; "caudex\* subarborescens prostrate," stipes? glabrous, main rachis thick as a swan's quill stramineous brown and as well as the secondary rachises very glossy, fronds ample "12–15 feet long" subsucculent coriaceous-membranaceous bi-tripinnate, primary pinnæ distant opposite or alternate subsessile  $1\frac{1}{2}$ –2 feet long 10–12 inches wide oblong acuminate at the young and tender

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\* "Cette fougère forme, par la réunion de ses rudiments pétiolaires persistants, une sorte de tronc de plusieurs pieds de hauteur sur 5 à 6 pouces de diamètre, qui n'ayant pas assez de force pour se tenir droit, se courbe et se contourne sur le sol. La partie supérieure, qui se redresse, est couronnée de feuilles longues de 5 à 7 pieds," etc.—*Gaudichaud*.

apices, secondary pinnæ sessile opposite or alternate distant but in the younger pinnæ often united by a narrow wing, from a broad truncated base oblong acuminate deeply nearly to the costules (which are smooth hairy beneath) pinnatifid with oblong subfalcate gradually tapering but obtuse entire opposite or alternate segments entire at the margins which are a little reflexed, the sinuses very acute, veinlets rather distant pellucid once or twice forked, sori on the superior branch of the veinlet forming two series nearer the margin than the costule.—*Gaudich. in Freyc. Voy. Bot. p. 362. t. 7 (very good). Brack. Fil. U. S. Expl. Exp. p. 15. Phegopteris, Metten. Phegopt. p. 29.*—Var.  $\beta$ , tripinnate, segments and ultimate pinnules an inch long acuminate dentato-pinnatifid.

Hab. Sandwich Islands, *Gaudichaud, Brackenridge, Dr. Diell, Hillebrand.*— $\beta$ , *Hillebrand.*—A very remarkable species, with a pteroid habit; perhaps in this respect more allied to *P. pterodeum* than to any other Fern. Brackenridge estimates the length of the fronds at 12–15 feet: “they are sustained in a more or less erect position by the reflected points of the pinnæ, which bend over and around the branches of neighbouring plants. These fronds also continue to grow at the points, while at the same time, for a distance of 2–3 feet and upwards from the ground, they are fully developed and bear ripe sori.” My var.  $\beta$  is certainly tripinnate, and the ultimate segments or pinnules are dentato-pinnatifid, like the segments in the following species, *P. procerum*; but they are more acuminate, and the frond is glabrous. Some of the specimens, or, rather, portion of a specimen, of this, have also secondary pinnæ quite like those of *P. Keraudrenianum*.

218. *P. (Phegopteris) procerum*, Brack.; “caudex creeping, fronds 6–8 feet long elongated erect bipinnate, pinnæ opposite sessile horizontal linear-attenuate pinnated at the base pinnatifid towards the apex, pinnules subalternate oblong obtuse crenate, general rachis glabrous, partial with the costæ and veins beneath pubescent setose on the upper side, veins dichotomous, sori small distant solitary, capsules echinate.” *Brack. Fil. U. S. Expl. Exp. p. 14. t. 3 (excellent).*

Hab. Sandwich Islands, in the thickets and low trees, *Brackenridge, Hillebrand.*—Brackenridge remarks that, “in habit, this bears a strong resemblance to the *P. Keraudrenianum*, Gaud. (our previous species), but is very distinct in the form and size of the divisions.” It is true that the form represented by Brackenridge does look very distinct from the *P. Keraudrenianum*, as figured by Gaudichaud; but in my remarks on the latter species I have had occasion to notice a state which indicates a passage from the one to the other, and further observations will, I think, prove the two to be identical.

219. *P. (Phegopteris) Berteroanum*, Hook. not Spr.; caudex?, stipes?, rachis stramineous brown setoso-paleaceous, base of the setæ tuberculate, frond  $1\frac{1}{2}$ –2 feet and probably more long 8–18 inches wide coriaceous-membranaceous more or less

hairy on the costules and veins especially beneath (where they are often hispid) broad-oblong ovate or deltoid-ovate acuminate tripinnate sometimes viscid beneath opaque, primary lower pinnæ sometimes nearly a foot long and bipinnate, all the pinnæ sessile, ultimate ones or pinnules quite adnate  $1\frac{1}{2}$ –2 inches and more long  $\frac{1}{4}$ – $\frac{1}{2}$  an inch wide oblong bluntly acuminate deeply almost to the costa pinnatifid, segments semiovate suberecto-patent subacute, the inferior basal one shorter than the superior and always adnate with and decurrent upon the rachis, the margin entire or dentato-pinnatifid, veinlets simple distant, sori more or less copious one to each tooth or segment dorsal, secondary rachises often villous.

Hab. Juan Fernandez, on wooded hills, *Bertero*, n. 1660, *Cuming*, n. 1326, *Douglas*, *Scouler*, *Philippi* ("Phegopt. rugulosa"), very large form. Conception, *Cuming*, n. 823. Valdivia, *Bridges*. Chiloe, *Capt. Ph. King*. Chatham Island, Galapagos, *Capt. Wood* (submembranaceous, segments elongated, lobes shorter, lowest inferior often forming an axillary lobe between two segments, probably distinct).—Var.  $\beta$ . Valdivia, *Philippi*. It is remarkable that so distinct a looking species as this, and collected by so many Chilian travellers, should, as far as I can find, be hitherto unpublished.

220. *P. (Phegopteris) aquilinum*, Th.; caudex?, stipes 1–2 feet long stout dusky-brown clothed at the base with linear-acuminated-imbricated glossy scales  $\frac{1}{2}$ – $\frac{3}{4}$  of an inch long, the rest tuberculate and downy and appresso-paleaceous with small scales, fronds 1–4 feet long sometimes 1–1 $\frac{1}{2}$  foot broad hard thick coriaceous and dark-brown when dry broad deltoid-ovate bi-tripinnate, primary inferior pinnæ often opposite 6–10 inches long obliquely ovate, their inferior secondary pinnæ the longest, ultimate pinnæ or pinnules  $1\frac{1}{2}$ –3 inches long oblong linear sessile rather obtuse deeply pinnatifid almost to the rachis, segments ovate subfalcate entire, lowest inferior one especially adnate with and often wholly attached to the rachis thus forming an intermediate lobe, veinlets sunk very indistinct apparently simple, sori forming two series between the costule and the margin, main and secondary rachises very stout straight pubescent partially and minutely scaly and tubercled, costules beneath very pubescent.—*Thouars*, *Fl. Trist. d'Acun.* p. 32. *Carm. Trist. d'Acun. in Linn. Trans.* xii. p. 40. *P. tomentosum*, *Thouars*, l. c. *Aspid. bifidum*, *Carm. l. c.* p. 511.

Hab. Tristan d'Acunha, growing in large tufts, *Thouars*, *Carmichael*, *Milne and Macgillivray*.—A very harsh, rigid, almost unsightly-looking Fern; yet with something of the ramifications of *Pteris aquilina*, which no doubt suggested the

specific name, and more perhaps the aspect of *Polyp. Berteroanum*, so caused by the lowest inferior lobe being adnate with the rachis, and, in a measure, separated from the pinnules. Carmichael's name of *bifidum* was probably given from an accidentally forked specimen; the one from him in my herbarium is not so, nor do I find any indusium on the sorus; and Aubert du Petit Thouars says especially, "punctis fructiferis parvis et nudis."

221. *P. (Phegopteris) Vogelii*, Hook.; caudex?, stipes 2 feet or more long nearly as thick as a writing pen stramineous glossy furrowed when dry paleaceous at the base with sparse spreading subulate dark-brown scales  $\frac{1}{2}$  an inch long, frond ample 4 feet or more long firm-membranaceous glabrous or hairy only on the veins beneath deltoid-ovate tripinnate, primary inferior pinnæ 12–15 inches long almost a foot wide long-petioled their secondary pinnæ and the superior primary pinnæ uniform 4–6 inches and more long 2 inches wide short-petioled oblong acuminate deeply (except near the apex) pinnatifid nearly to the costa pinnated in the lower portion, segments and pinnules about an inch long  $\frac{1}{2}$ – $\frac{1}{3}$  of an inch wide oblong-ovate obtuse with a truncated superior base, the margins lobato-pinnatifid generally more deeply on the upper margin, the inferior base decurrent, the rachis winged, veinlets one to each tooth or lobe of the pinnule or segment forked, the superior branch soriferous near its base, sori rather distant forming a series between the costule and the margin.

Hab. West tropical Africa: Fernando Po, *Vogel*, n. 229, *Gustav Mann*, n. 352; Aboh, on the Quorra, *Barter*, in *Baikie's Exp.* n. 158; Isle San Nicol, Cape de Verdes, *Forbes*.—Forbes's plant has the ultimate segments and pinnules decurrent, and may probably prove a distinct species.

222. *P. (Phegopteris) vestitum*, Hook.; "frond robust oval tripinnatifid pilose on the veins beneath, pinnæ alternate lanceolate long-acuminate, pinnules linear pinnatifid acuminate rather obtuse at the apex, lobes (segments and pinnules) alternate oblong obtuse, the margins revolute confluent at the apex, sori uniseriate, capsules subglobose flexuose, stipes and rachis densely puberulous cinerascens and besides clothed beneath with elongated blackish scales." *Phegopteris vestita*, *Philippi*, *Pl. Chil. in Linnæa*, xxi. p. 107 (not *Polyp. vestitum* of *Forster* or *Raddi*).

Hab. South Chili, Valdivia, *Philippi*, in *Herb. nostr.*—"Pinnules 2 inches long,  $\frac{3}{4}$  of an inch wide; lobes 5 lines long, 3 lines wide: a species easily distinguished by the alternate character of the pinnæ, pinnules, and lobes, and no less so by the two kinds of indumentum on the stipes." *Philippi*. The specimens in my herbarium, for which I am indebted to the author, are two (apparently) pri-

mary coriaceo-membranaceous pinnæ a span to a foot long, glanduloso-viscid beneath, together with a portion of the main rachis; this latter is as thick as a goose-quill, striato-sulcate, and, as well as the secondary rachises and costæ, densely pubescent, not sensibly glandular, the pubescence mixed with many scattered, small, subulate, dark-brown scales; secondary pinnæ  $2\frac{1}{2}$ -3 inches long, sessile, from a broad base, oblong, gradually acuminate, pinnated below, pinnatifid in the upper half; segments oblong, subentire; pinnules  $\frac{1}{2}$ - $\frac{3}{4}$  of an inch long, adnate, with subdecurent base, oblong, obtuse, lobato-pinnatifid; lobes rounded; venation obscure; sori copious, scattered, often marginal, and often two or three on each lobule. In habit it resembles a large form of *P. rugulosum*, yet it seems quite distinct.

223. *P. (Phegopteris) rugulosum*, Labill.; caudex long creeping rufo-villous rather than in any way scaly, whole plant more or less hairy and glanduloso-viscid especially beneath, stipes 1-2 feet and more long varying in size from a crow's to a swan's quill and as well as the main rachises glossy and rough with elevated points bright castaneous or stramineous, frond often small but varying from 6-8 inches in length very slender (perfect and fertile) to 3-4 and more feet in length, from 4 inches to 3 feet wide at base, deltoid-ovate subcoriaceous (rarely submembranaceous and flaccid) tripinnate, primary pinnæ generally in distant petiolated pairs, lowest primary pinnæ (in a specimen now before me) 18 inches long and 10 inches wide oblong-ovate acuminate, secondary pinnæ 1-4-5 inches long sessile from a broad base oblong-acuminate, pinnules  $\frac{1}{2}$ - $\frac{3}{4}$  of an inch long oblong or linear-oblong obtuse lobato-pinnatifid with small rounded lobes rarely angulato-dentate at the margin, veinlets once or twice forked within each lobe, the lower superior branch extending to the margin at the sinus of the lobes and there bearing a solitary sorus but so copious (10-14 on each pinnule) that they frequently cover the whole under-surface of the frond, secondary rachises terete not winged.—*Labill. Fl. Nov. Holl.* ii. p. 92. t. 241. *Br. Prodr.* p. 147. *Hook. fil. Fl. Nov. Zeal.* p. 41. *Sieb. Syn. Fil. n.* 103. *Phegopteris*, *Fée. Metten. Phegopt.* p. 12. *Pol. Pæppigii*, *Kze. in Linnæa*, ix. p. 50 (*in Herb. nostr.*). *Phegopteris*, *Metten.* *Hypolepis*, *J. Sm. (fide Metten.)*. *Pol. fulvescens*, *Hook. et Grev. Bot. Misc.* ii. p. 239. *Pol. viscidum*, *Spr.* *P. viscosum*, *Roxb.* *Pol. viscoso-viscidum*, *Thouars, Fl. Trist. d'Acunha*, p. 33. *Cheilanthes*, *Carm. Fl. Trist. d'Acunha, in Linn. Trans.* xii. p. 511. *Cheil. ambigua*, *A. Rich. Fl. N. Zeal.* *Cheil. Dicksonioides*, *Endl. and Kze. in Schk. Fil. Suppl.* t. 8, consequently *Hypolepis Dicksonioides*. *Hook. Sp. Fil.* ii. p. 61. *H. Pæppigiana*, *Metten. Fil. Lechl.* p. 18 (*specimen from Lechler*).

Hab. Van Diemen's Land, *Labillardière*; since found very abundantly there and in the south and east of Australia, from Victoria to Moreton Bay, *Brown, Mueller, and others*. New Zealand, north and middle island, as far south as Houraki Gulf and Acheron (*Lyall*). Lord Auckland's group, *Hook. fil.* Norfolk Island, *Bauer, Dr. V. Thomson*. India, very abundant, especially in Himalaya, etc., *Wallich* (*P. marginale*, *Wall. Cat. n. 322*, *Aspid. marginatum*, *n. 391*, and *Aspid. divisum*, *n. 393*). Java (*Miquel*), *De Vriese and Teijsmann*, *n. 11, 479, and 481*, *Thos. Lobb*, *n. 261*. China, *Chusan, Alexander*. Ceylon, *Mrs. Gent. Walker*. South America: Chili, *Poeppig, Cuming*, *n. 203, 149, 635*, *Bridges*, *n. 552*, *Philippi* (who, as well as Bridges and Bertero, considers it identical with *Polyp. spectabile* of Kaulfuss, certainly a Chilean plant, but certainly not the *Phegopt. spectabilis* of Fée, which Mettenius considers the plant of Kaulfuss, see p. 259), *Gillies*; Chiloe, *Capt. Ph. King*; Valdivia, *Bridges*, *n. 813*; Juan Fernandez, *Bertero* ("Pol. spectabile"), *n. 1654*, *Cuming*, *n. 1348*; Ecuador, *Jameson, Spruce*, *n. 5716* (very large, secondary pinnæ pinnatifid rather than pinnate, segments less pinnatifid); Peru, *Pasco, Mathews, Cruckshanks* (*Pol. fulvescens, Hook. and Grev.*). St. Helena, *Cuming*, *n. 1348 and 433*, *Hook. fil., Nuttall, Lefroy*. Tristan d'Acunha, *Thouars, Carmichael*. Bourbon (*ex Herb. Mus. Par.*). Fernando Po, *Barter, Mann*.—Perhaps no Fern has been so generally misunderstood as the present, both in regard to genus and to the limits of the species; and this is partly owing to its being very variable, both in size and texture, and to the close proximity of the sori to the margin of the pinnules, and the frequent inflection of the lobes of those pinnules, which give the appearance of an involucre of a *Cheilanthes* or *Hypolepis*, to which also may be added the wide extent of geographical distribution. *Labillardière* has well described and well figured the plant; yet I have myself often found it difficult to distinguish between some forms of *Hypolepis hostilis*, Kze., and *H. pteroides*, Mett., especially *H. Purdieana*, Hook. In the localities I have here given, taken exclusively from specimens in my own herbarium, I have been as careful as possible to exclude any forms which showed the smallest trace of a true involucre; yet I am far from satisfied with my decisions.

In bringing to a close this portion of my labours which treat of the *Polypodia* which have free veins, I must entreat indulgence for its many imperfections, especially in what concerns the decompound species. There are difficulties occasioned by variations common to Ferns in general, to which must be added those peculiar to specimens of large size, such as are manifest in different parts of the same specimen; and last, and not least, the possibility that our plant may, in some stages of its progress to maturity, be possessed of involucre, proving it to be not *Polypodiaceous*, but *Aspidiaceous*. Here, as elsewhere, I have excluded not a few doubtful species, of my own among the rest.

N.B.—The first part of the next Volume will commence with the species of *Polypodium* which have connivent or anastomosing veins.



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\* It is requested that at p. 254 this name may be altered to *P. Honoluluense*, there being already (at p. 228) a *P. Hillebrandii*.

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\* At p. 251, it is requested that this name may be altered to *P. Bojeri*.

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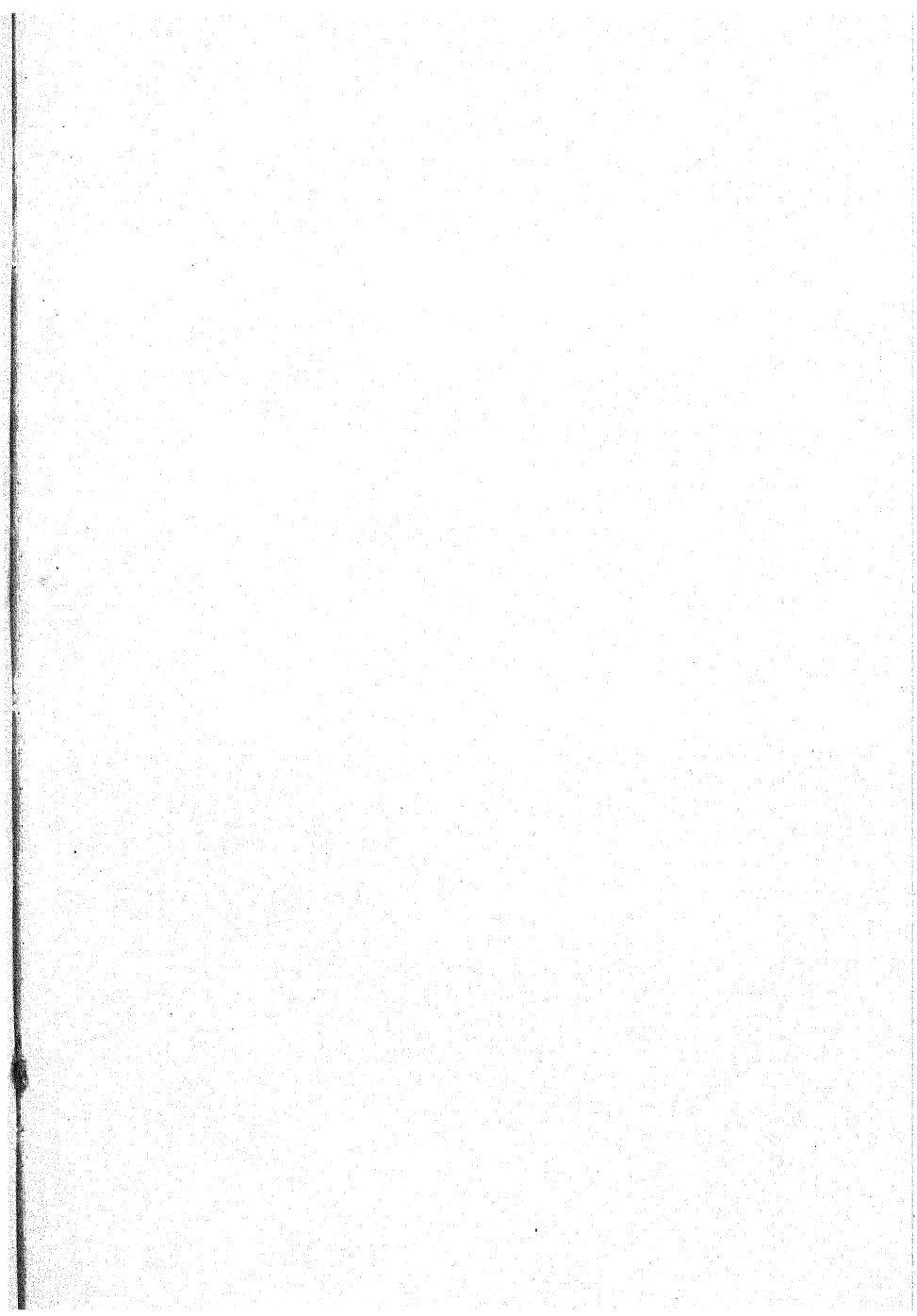
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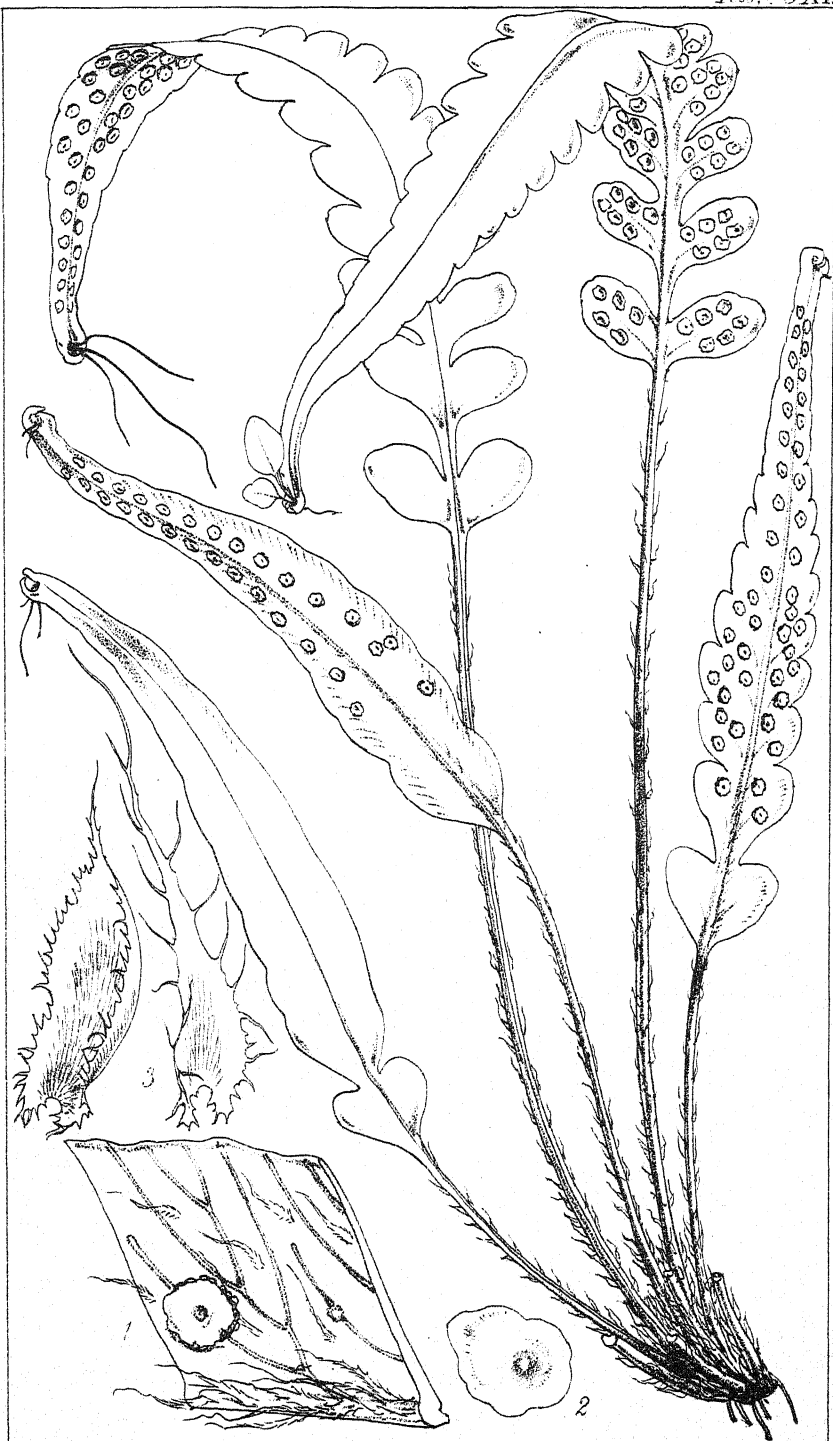


TAB. CCXI.

ASPIDIUM (POLYSTICHUM) PLASCHNICKIANUM, Sw.—p. 7.

Tuft of fertile fronds, viviparous at the apex; *nat. size*. Fig. 1.

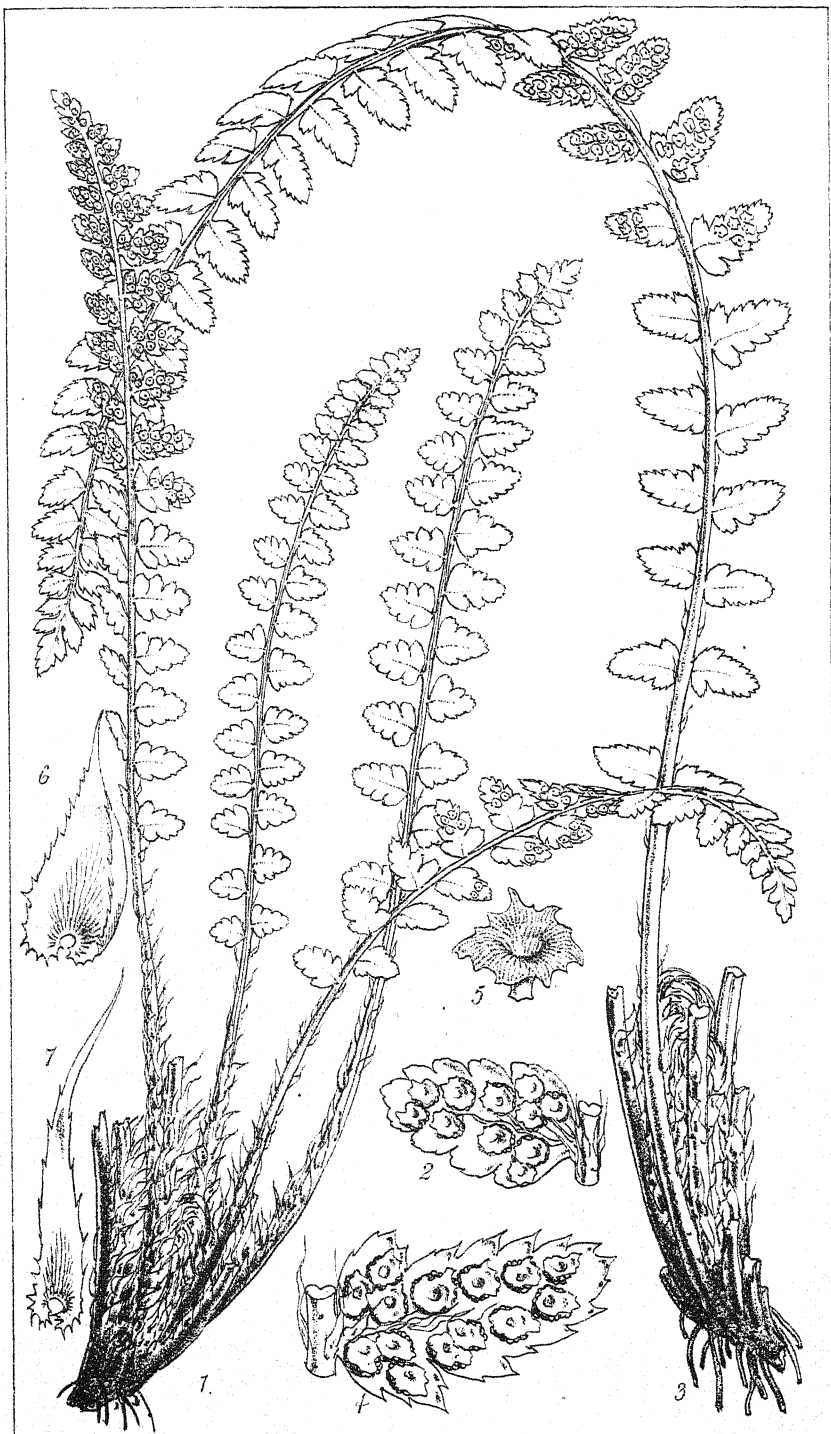
Portion of the underside of the frond with a sorus, and showing the venation. Fig. 2. Involucre. Fig. 3. Scales from the stipes; *magnified*.



TAB. CCXII.

ASPIDIUM (POLYSTICHUM) LACHENENSE, Hook.—p. 8.

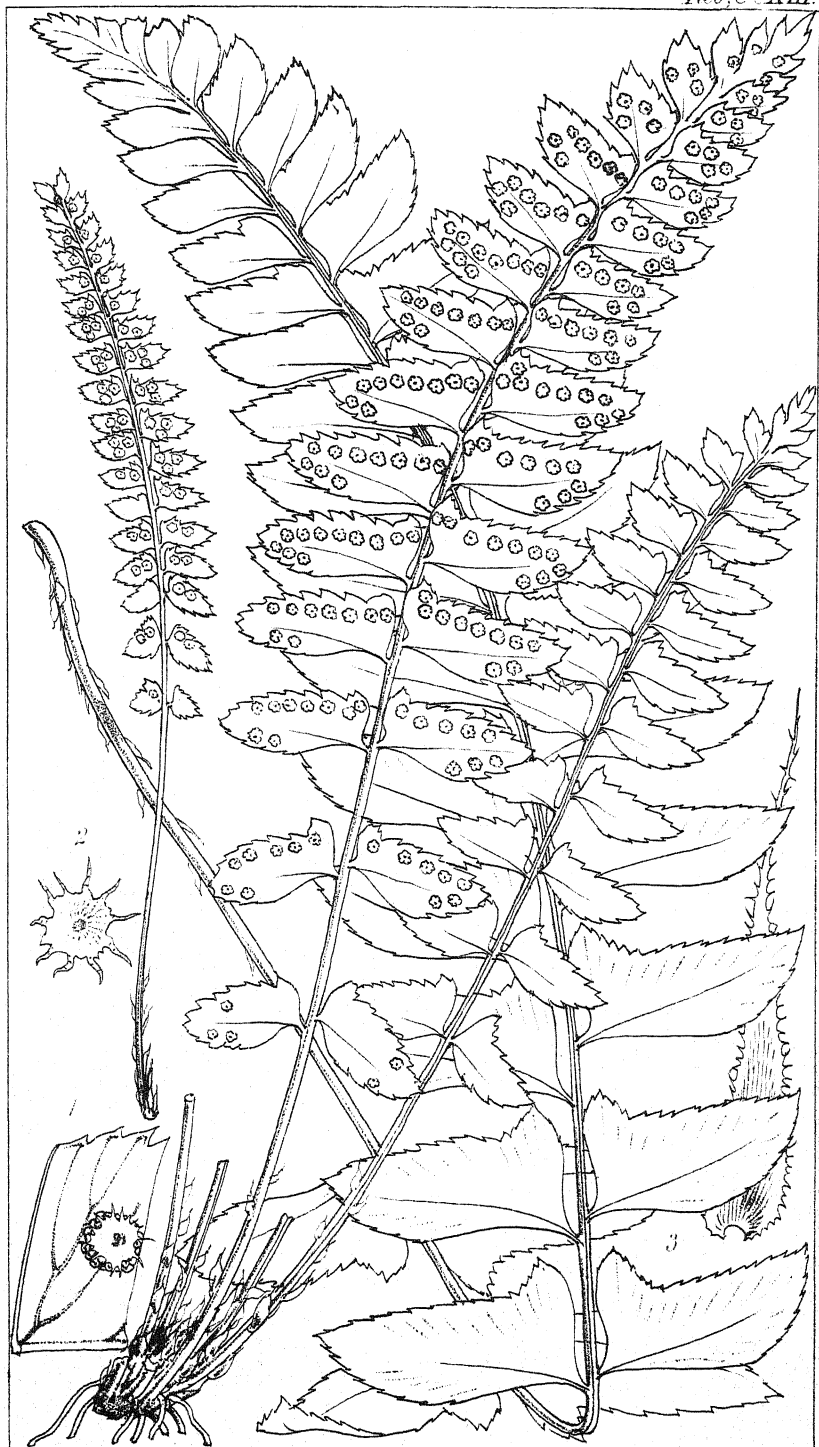
Fig. 1. Tuft of fertile fronds; *nat. size*. Fig. 2. Pinna from the same; *magnified*. Fig. 3. Tuft with a larger frond; *nat. size*. Fig. 4. Pinna from the same; Fig. 5. Involucre; Fig. 6 and 7. Scales from the stipes; *all more or less magnified*.



TAB. CCXIII.

ASPIDIUM (POLYSTICHUM) CÆSPITOSUM, *Wall.*—p. 13.

Various fronds, fertile and sterile ; *nat. size.* Fig. 1. Portion of a pinnule, with a sorus, and showing the venation. Fig. 2. Involucre. Fig. 3. Scale from the stipes ; *magnified.*





TAB. CCXIV.

ASPIDIUM (POLYSTICHUM) STIMULANS, *Kze.*—p. 12.

Tuft of fertile fronds; *nat. size.* Fig. 1. Pinna, with sori.

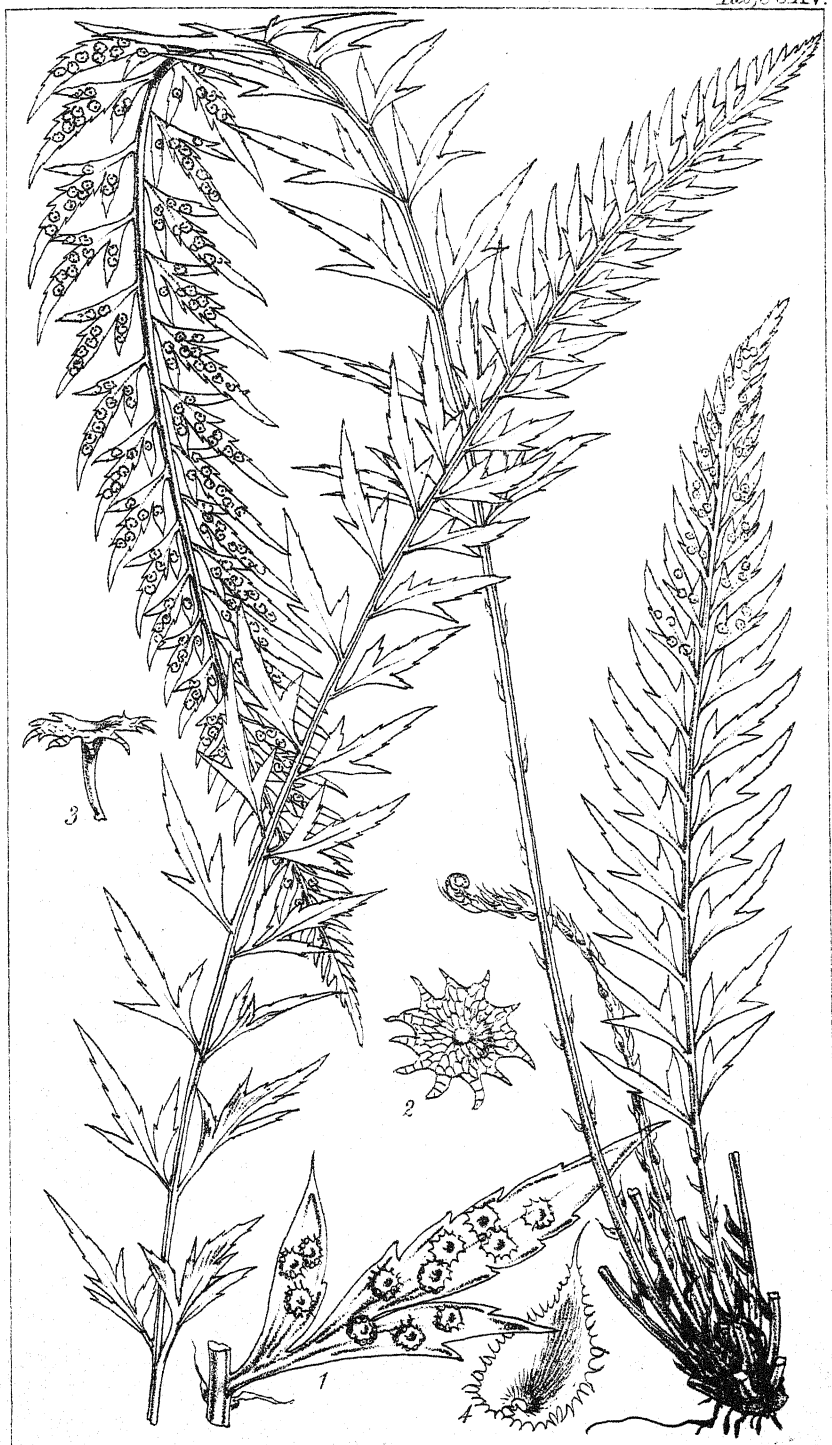
Fig. 2. Portion of a pinna, with a sorus, and showing the venation. Fig. 3. Scale from the stipes; *magnified.*



TAB. CCXV.

ASPIDIUM (POLYSTICHUM) TRIDENS, *Hook.*—p. 15.

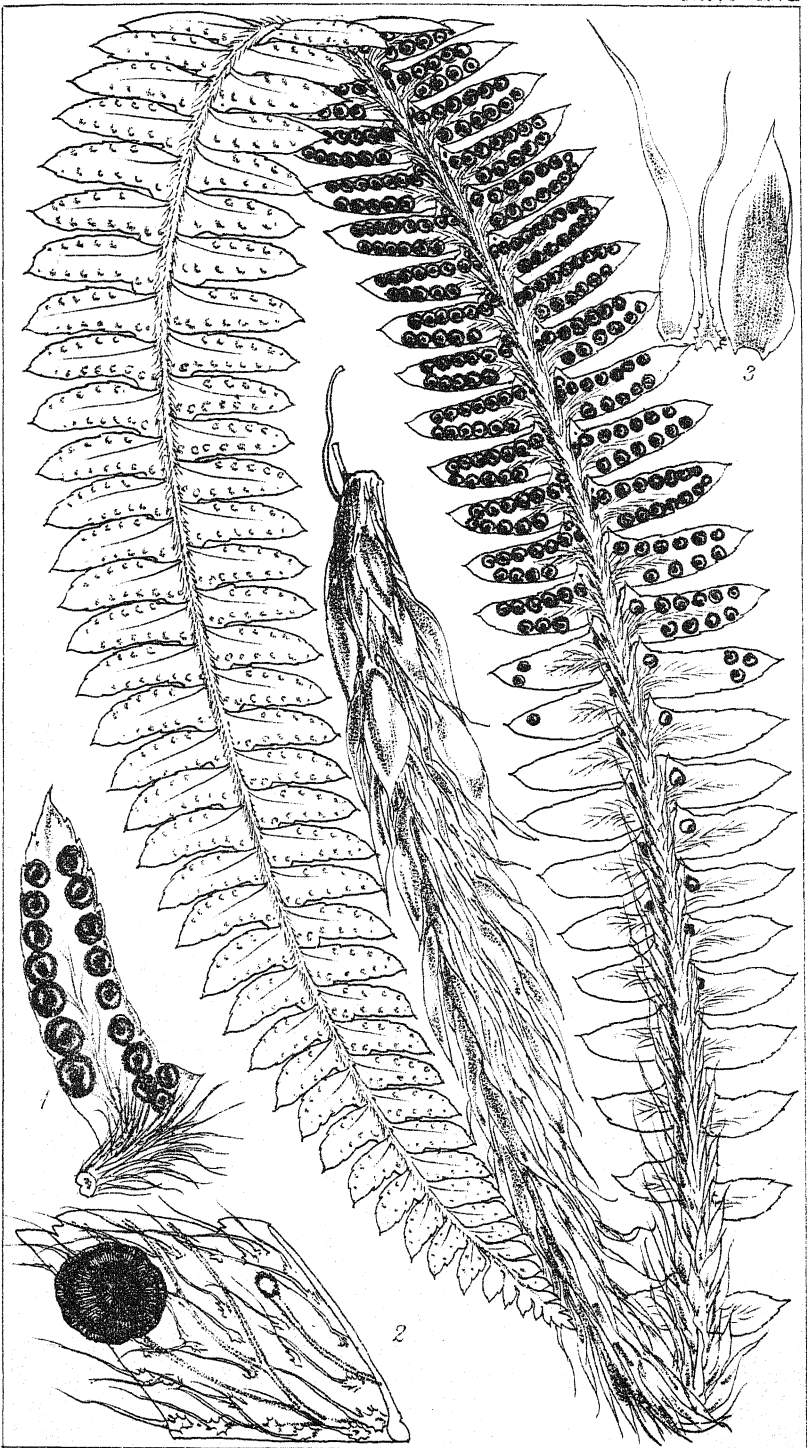
Tuft of fronds, sterile and fertile; *nat. size.* Fig. 1. Fertile pinna. Fig. 2. Involucre, seen from above. Fig. 3. Involucre, side view. Fig. 4. Scale from the stipes; *magnified.*



TAB. CCXVI.

ASPIDIUM (POLYSTICHUM) MUCRONATUM, Sw.—p. 9.

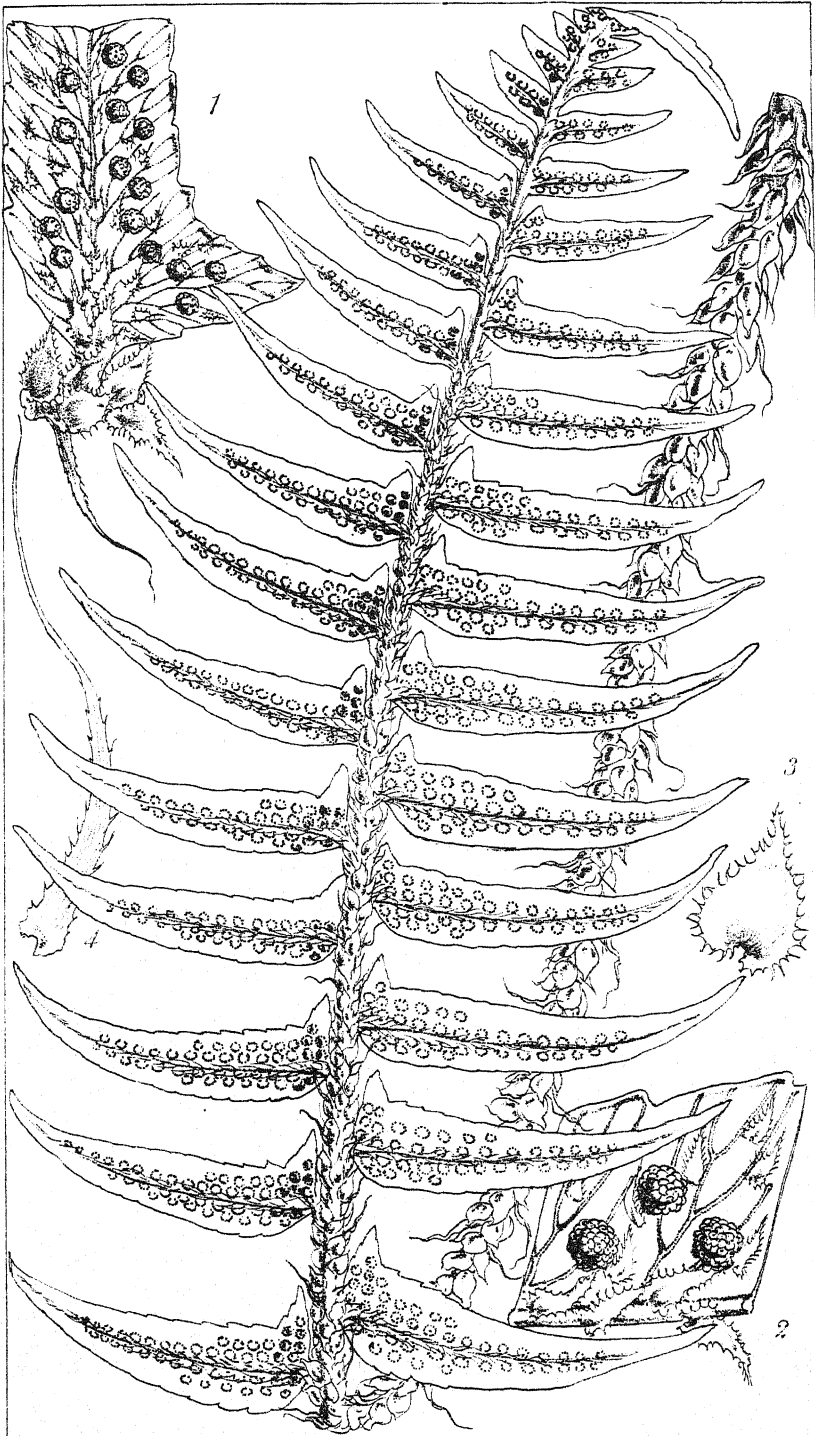
Fertile frond; *nat. size.* Fig. 1. Fertile pinna. Fig. 2. Portion of a pinna, with an involucre, and showing the venation. Fig. 3. Scales from the stipes; *magnified.*



TAB. CCXVII.

ASPIDIUM (POLYSTICHUM) LEPIDOCAULON, *Hook.*—p. 10.

Fertile frond; *nat. size.* Fig. 1. Portion of the rachis, with part of a fertile pinna, with numerous scales. Fig. 2. Portion of a pinna, with old sori, showing the venation. Fig. 3 and 4. Scales from the rachis; *magnified.*

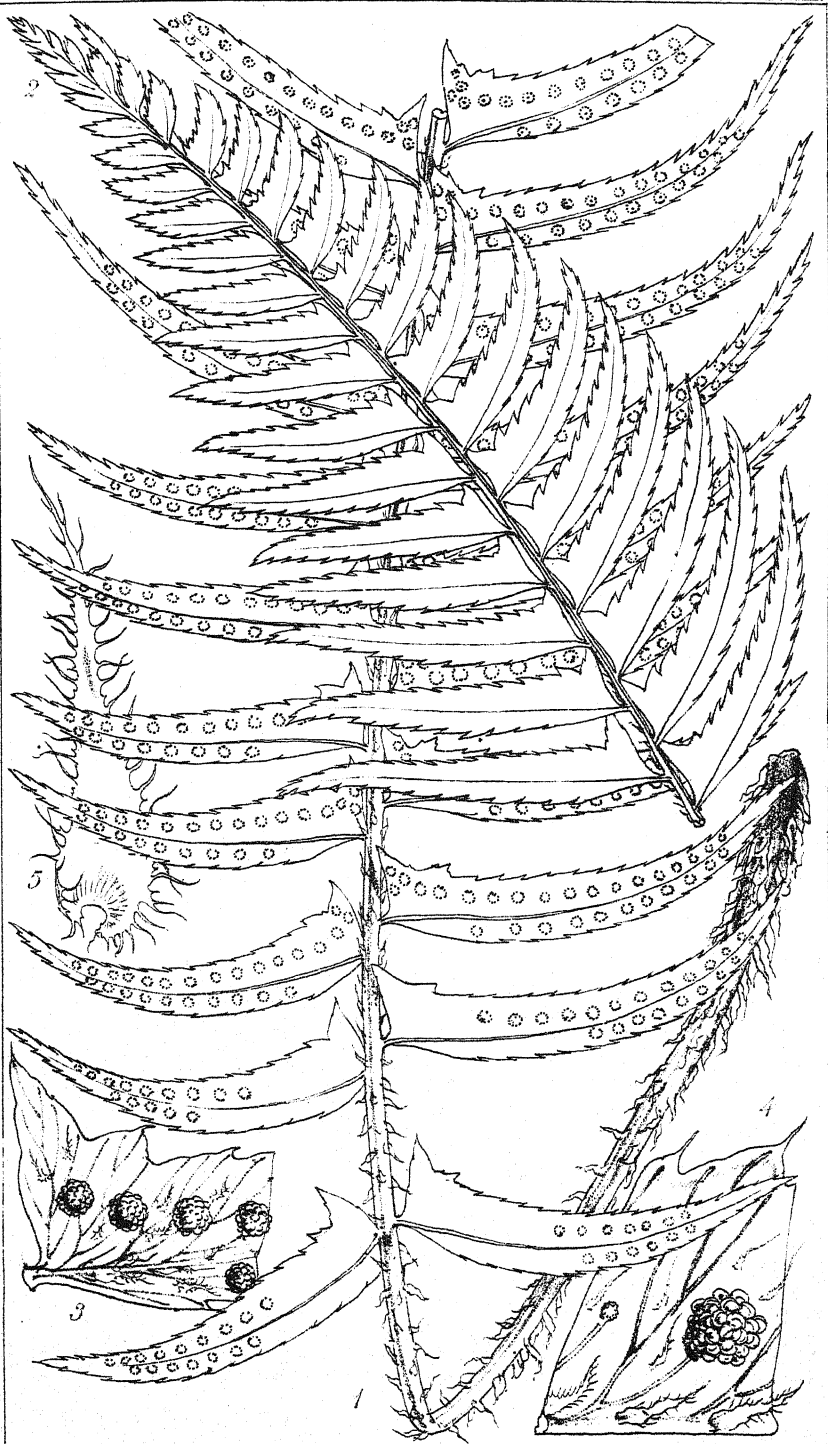




TAB. CCXVIII.

ASPIDIUM (POLYSTICHUM) AURICULATUM, Sw.—p. 11.

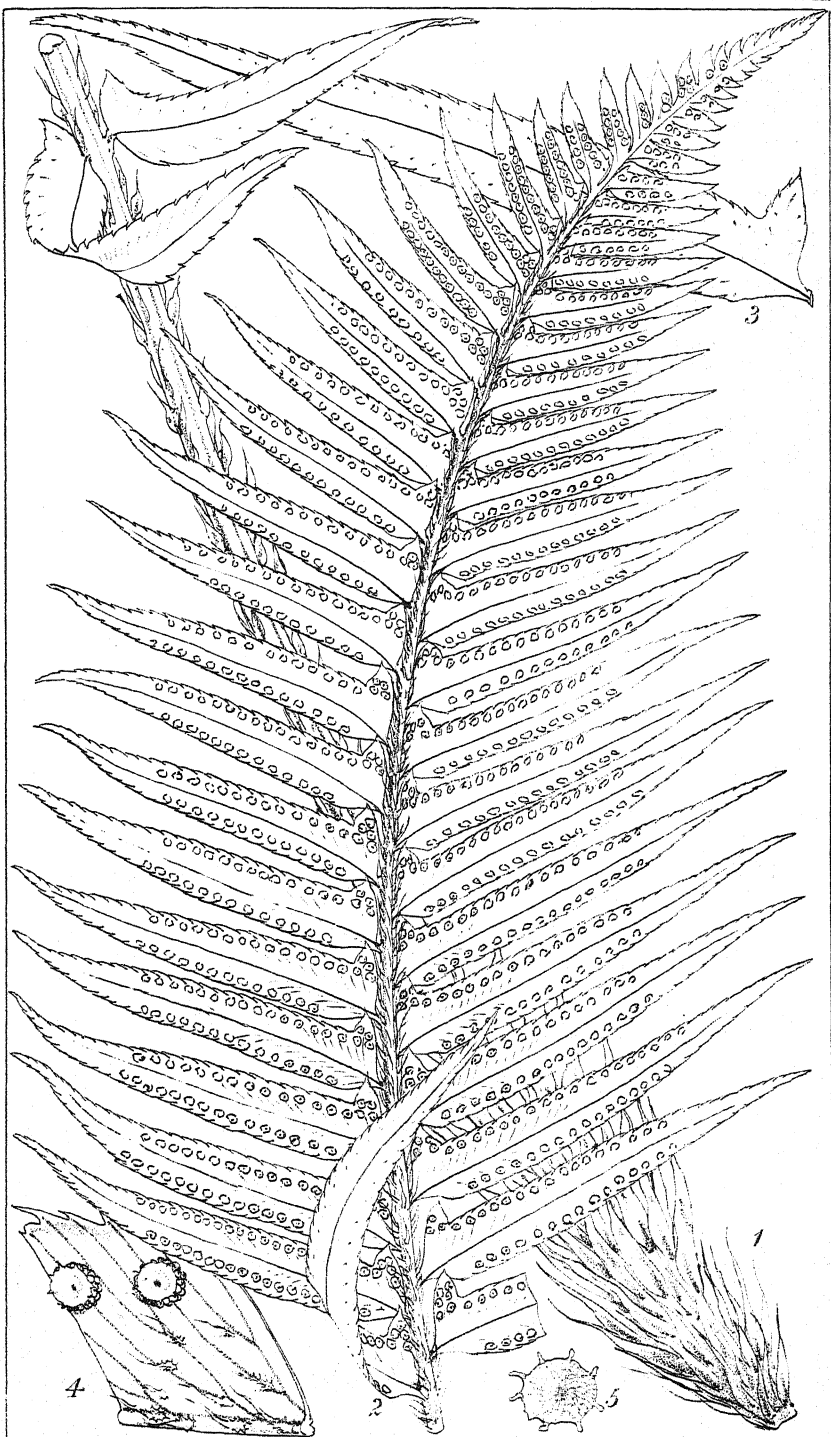
Fig. 1 and 2. Apex and base of a fertile plant ; *nat. size.* Fig. 3. Base of a fertile pinna, with sori. Fig. 4. Portion of a pinna, with an old sorus, and showing the venation. Fig. 5. Scale from the stipes ; *magnified.*



TAB. CCCXIX.

ASPIDIUM (POLYSTICHUM) MUNITUM, *Klfs.*—p. 10.

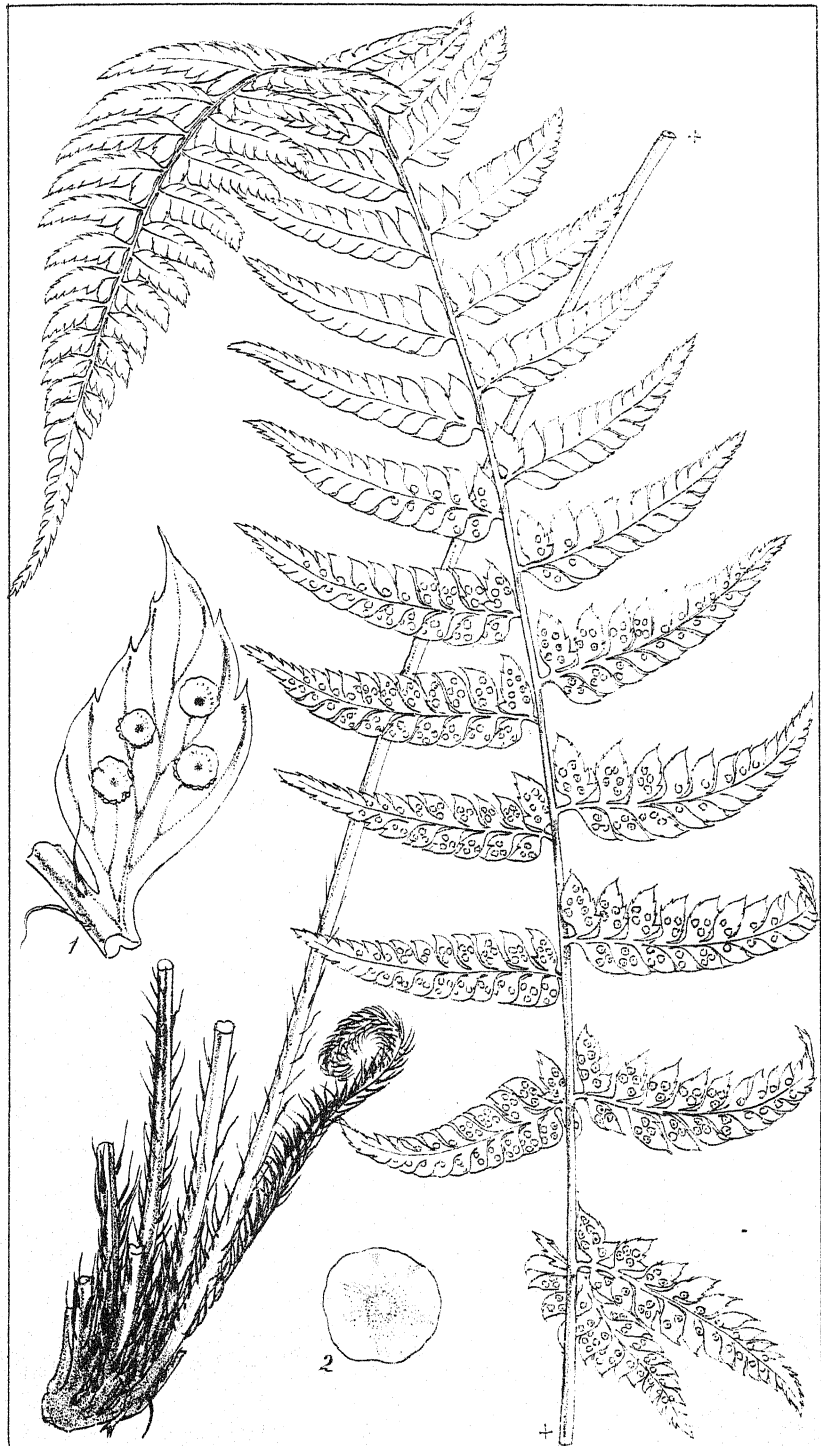
Fig. 1 and 2. Apex and base of a fertile frond ; *nat. size.* Fig. 3. Pinna. Fig. 4. Portion of a pinna, with two sori, and showing the venation. Fig. 5. Involucre ; *magnified.*



TAB. CCXX.

ASPIDIUM (POLYSTICHUM) TEUSSIMENSE, *Hook.*—p. 16.

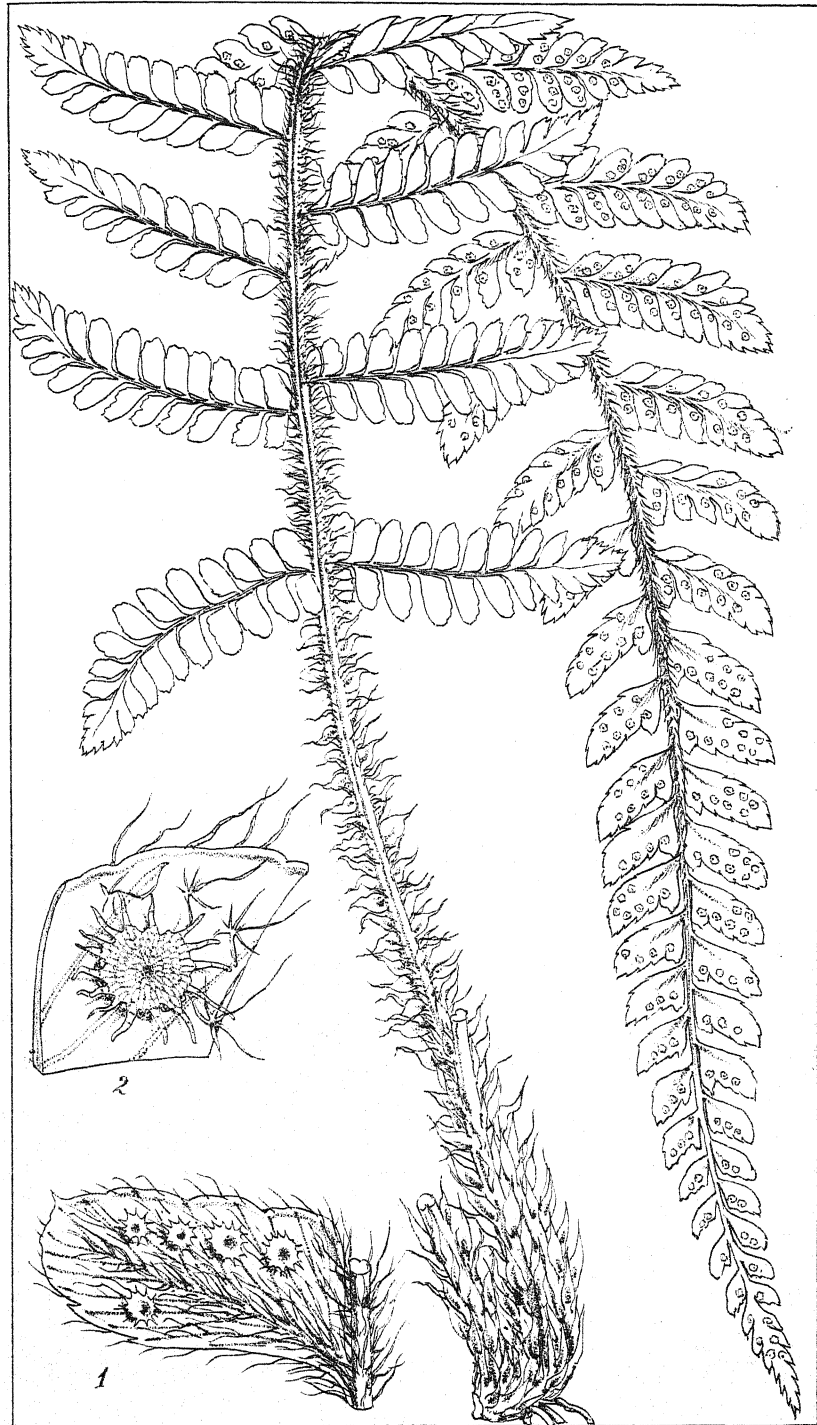
Fertile frond; *nat. size.* Fig. 1. Fertile pinnule, and showing  
the venation, Fig. 2. Sorus; *magnified.*



TAB. CCXXI.

ASPIDIUM (POLYSTICHUM) OBTUSUM, *Metten.*—p. 24.

Fertile frond; *nat. size.* Fig. 1. Fertile pinna. Fig. 2. Portion of a pinna, with a sorus; *magnified.*

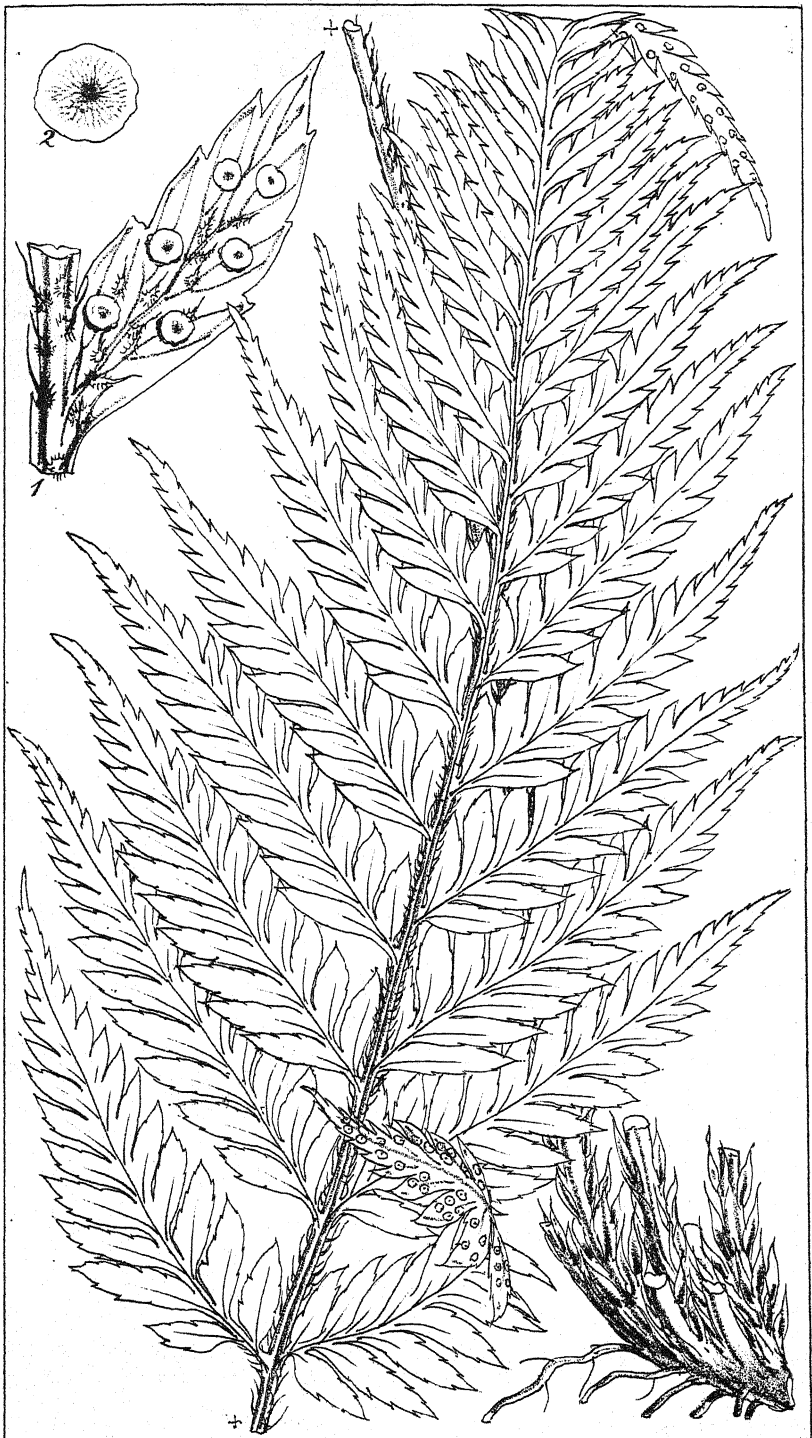




TAB. CCXXII.

ASPIDIUM (POLYSTICHUM) RICHARDI, *Hook.*—p. 23.

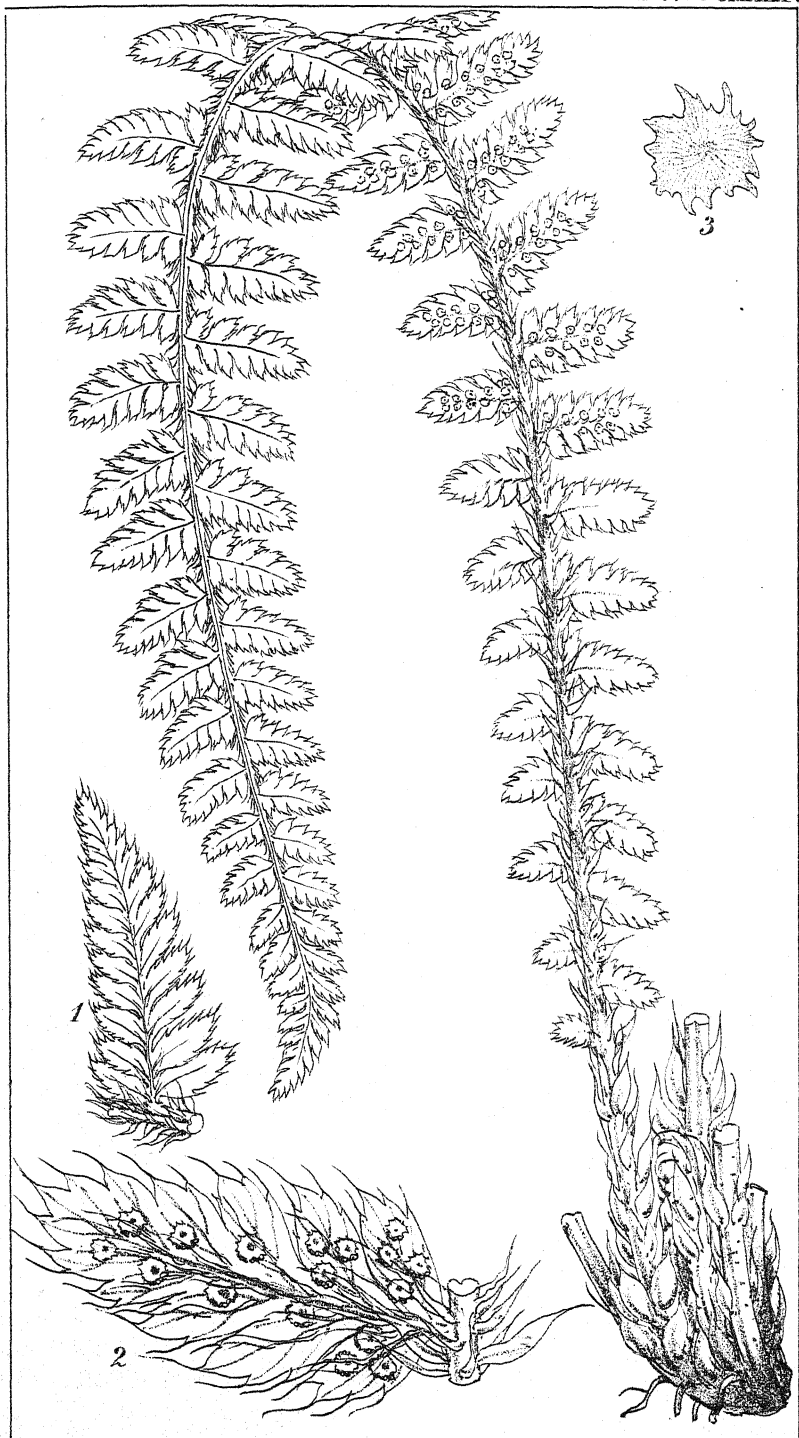
Fertile frond ; *nat. size.* Fig. 1. Fertile pinnule. Fig. 2. In-  
volucre ; *magnified.*



TAB. CCXXIII.

ASPIDIUM (POLYSTICHUM) PRESCOTTIANUM, *Wall.*—p. 22.

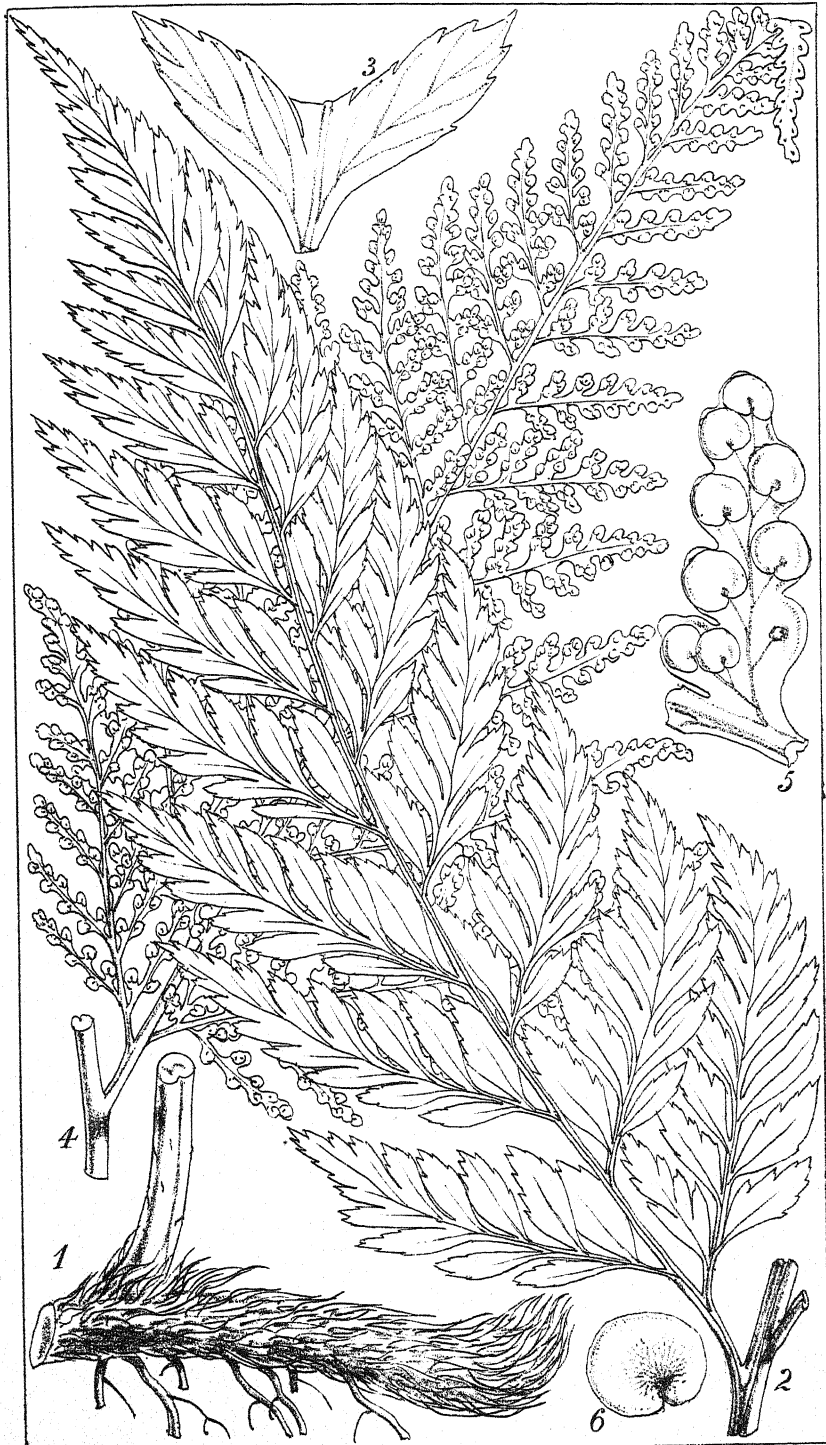
Fertile plant; *nat. size.* Fig. 1. Sterile pinna. Fig. 2. Fertile pinna. Fig. 3. Involucre; *magnified.*



TAB. CCXXIV.

ASPIDIUM (POLYSTICHUM) ADSCENDENS, *Hew.*—p. 32.

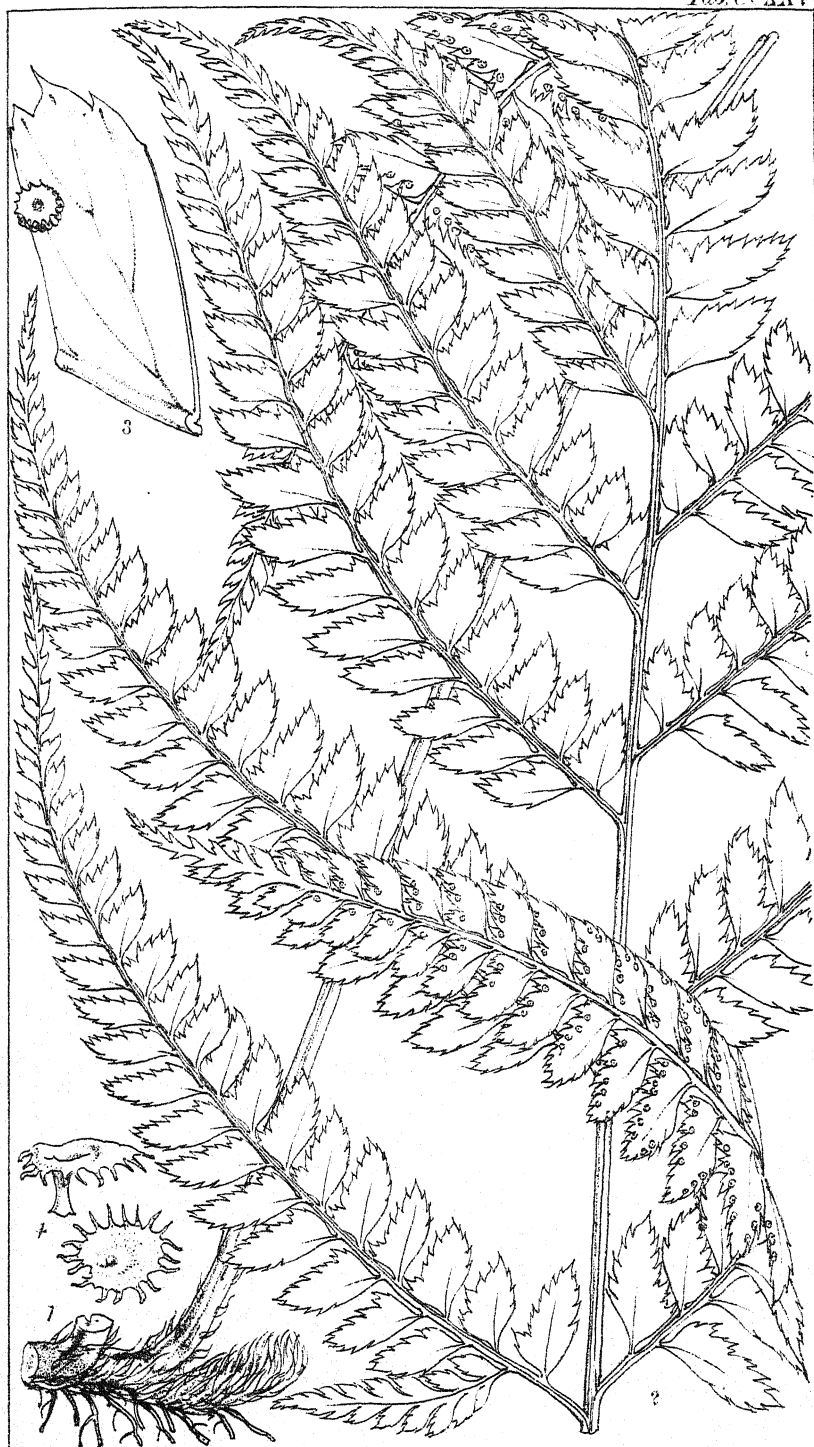
- Fig. 1. Portion of a caudex and stipes. Fig. 2. Sterile portion of a frond; *nat. size*. Fig. 3. Two segments; *magnified*.  
Fig. 4. Fertile portions of a frond. Fig. 5. Fertile pinnule.  
Fig. 6. Involucre (often quite lastreoid); *magnified*.



TAB. CCXXV.

ASPIDIUM (POLYSTICHUM) AMABILE, *Bl.*—p. 25.

Fig. 1 and 2. Plant; *nat. size.* Fig. 3. Portion of a fertile pinna. Fig. 4. Involucres; *magnified.*

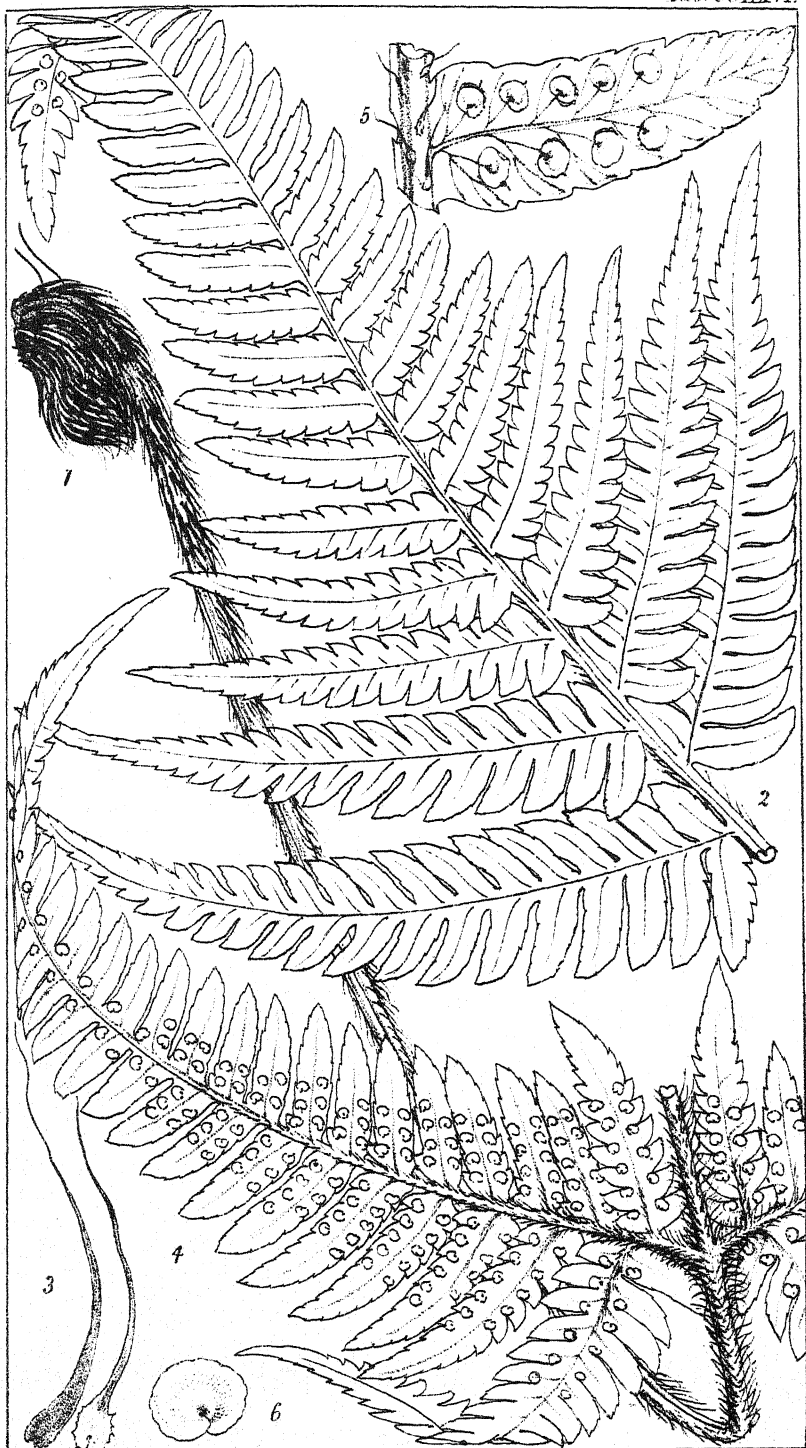




TAB. CCXXVI.

ASPIDIUM (POLYSTICHUM) VARIUM, Sw.—p. 30.

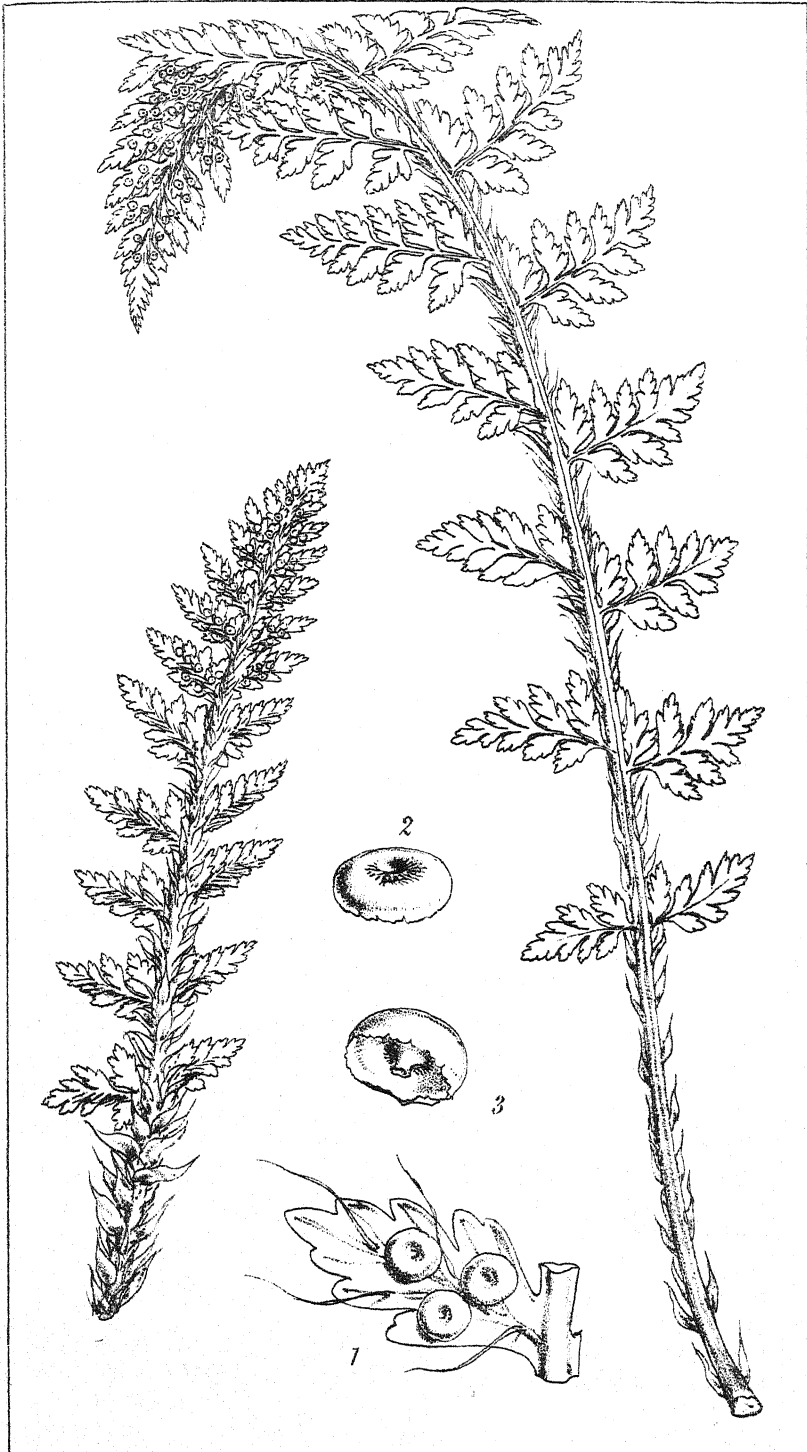
Fig. 1 and 2. Portion of the scaly caudex, stipes, and portion of a fertile frond; *nat. size.* Fig. 3. Scales from the caudex. Fig. 4. Scale from the rachis. Fig. 5. Fertile pinnule, seen from beneath. Fig. 6. Involucre (often lastreoid); *magnified.*



TAB. CCXXVII.

ASPIDIUM (POLYSTICHUM) CYSTOSTEGIA, *Hook.*—p. 26.

Fertile fronds; *nat. size.* Fig. 1. Fertile pinnule. Fig. 2, Upper, and Fig. 3, Underside of an involucre; *magnified.*



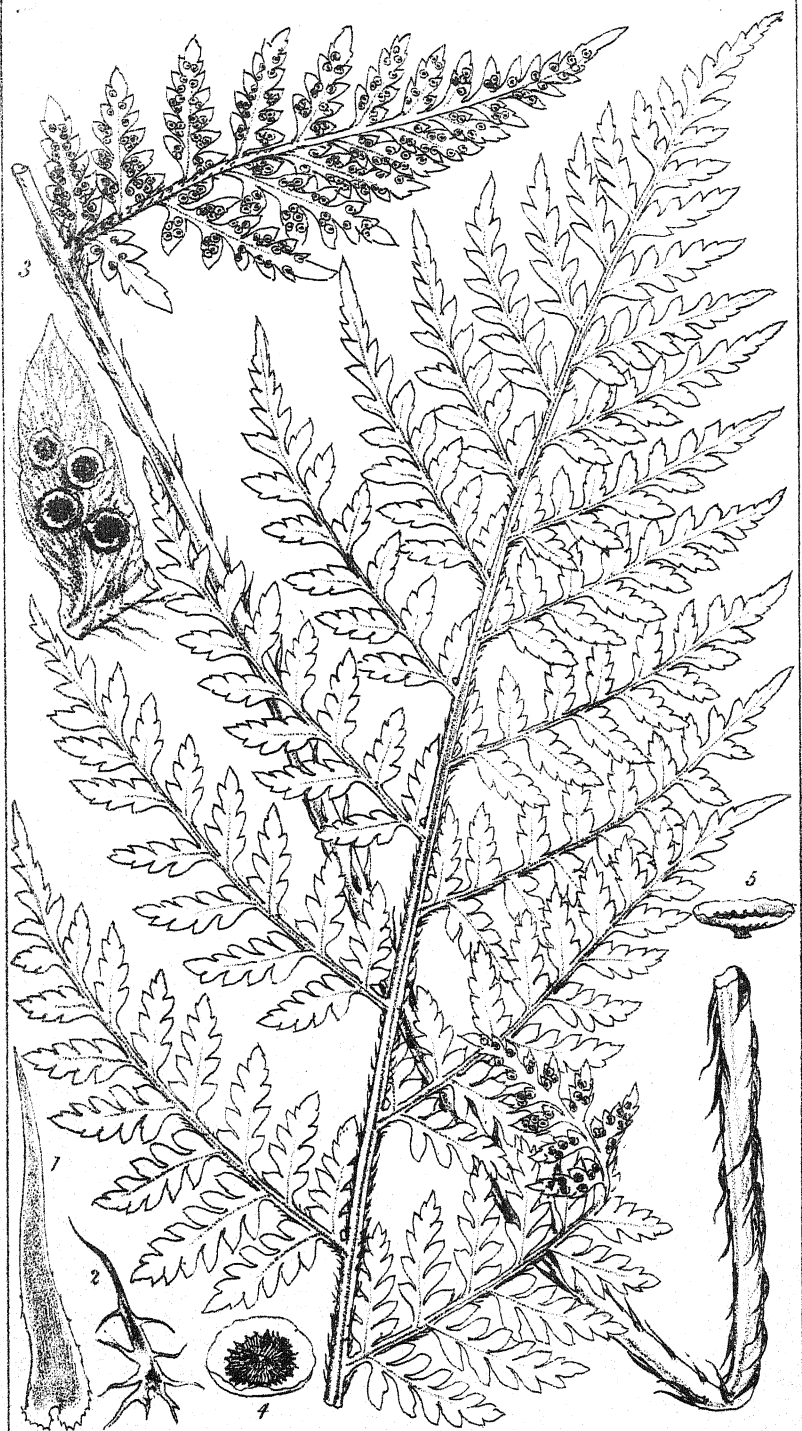
TAB. CCXXVIII.

ASPIDIUM (POLYSTICHUM) OCVLATUM, *Hook.*—p. 24.

Fertile frond; *nat. size.* Fig. 1 and 2. Scales from the stipes.

Fig. 3. Fertile portion of a pinnule. Fig. 4, Front, and

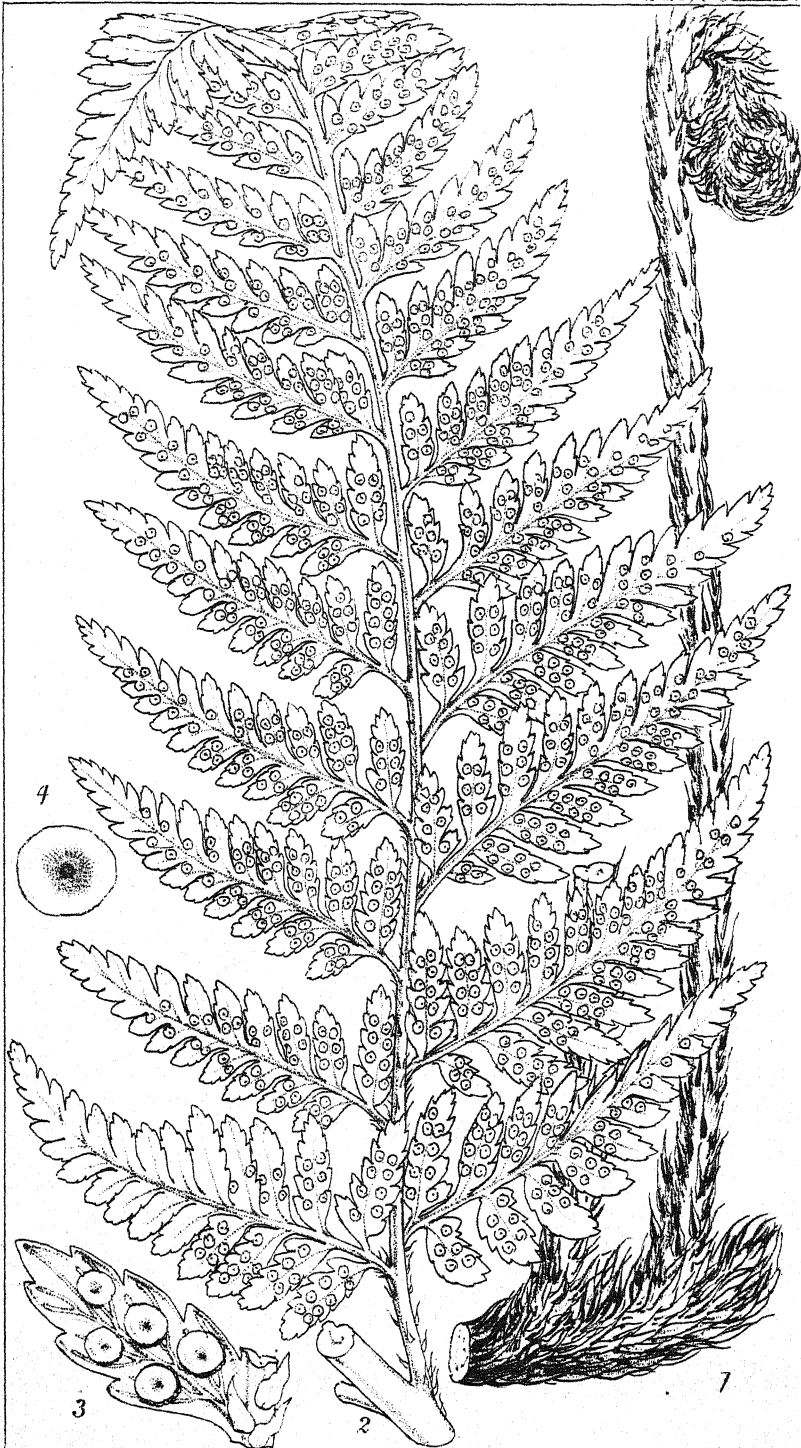
Fig. 5, Side view of an involucre; *magnified.*



TAB. CCXXIX.

ASPIDIUM (POLYSTICHUM) BERTEROANUM, *Colla.*—p. 33.

Fig. 1. Portion of a caudex, with a young frond, and Fig. 2, Portion of a fertile frond; *nat. size.* Fig. 3. Fertile pinule; *magnified.* Fig. 4. Involucre; *more magnified.*



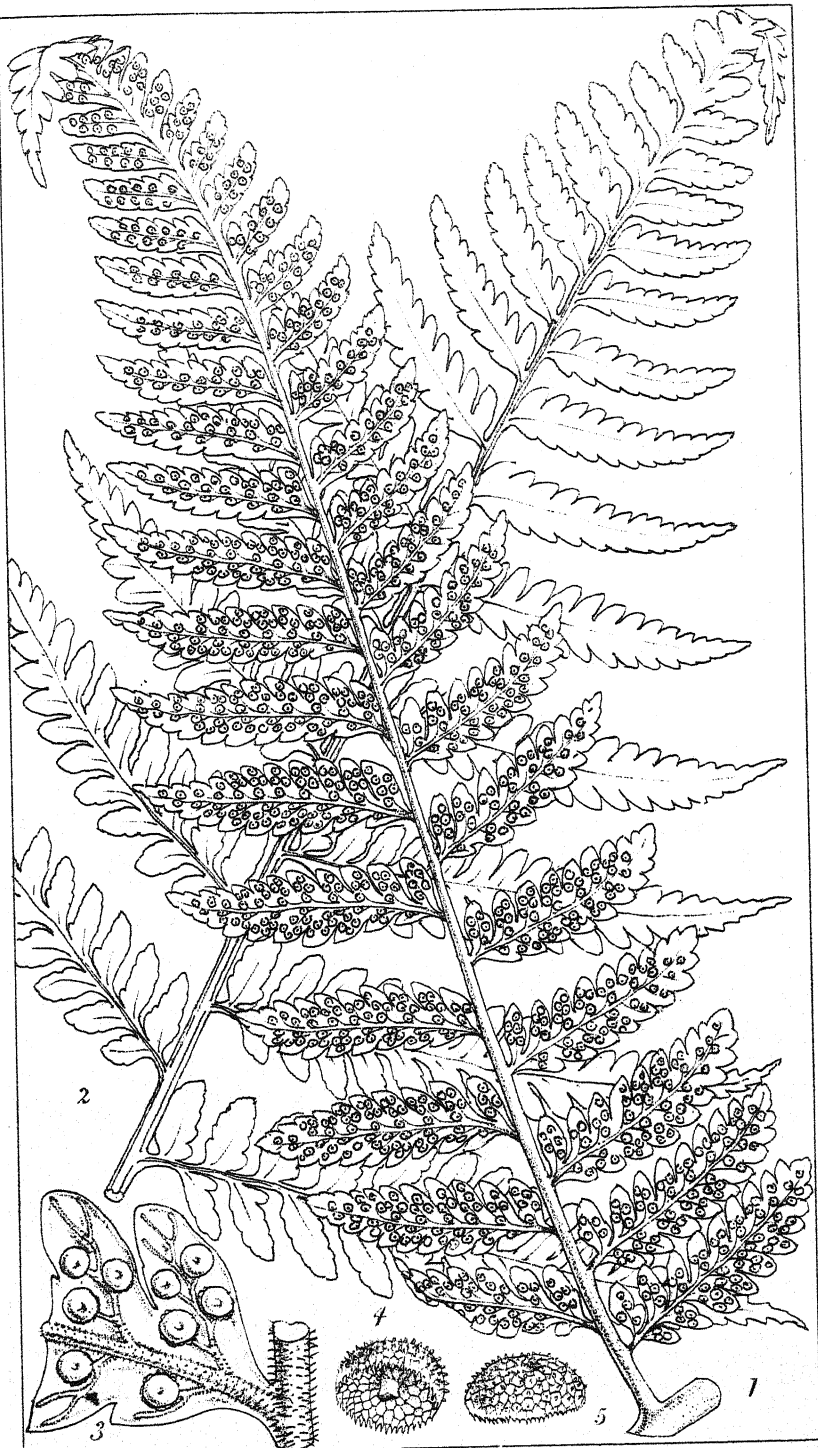


TAB. CCXXX.

ASPIDIUM (POLYSTICHUM) SEEMANNI, *Hook.*—p. 34.

Fig. 1 and 2. Fertile portions of a frond; *nat. size.* Fig. 2.

Portion of a fertile pinna, *magnified*, and showing the venation. Fig. 4 and 5. Involucres; *more magnified.*



TAB. CCXXXI.

ASPIDIUM (EUASPIDIUM) SEMIBIPINNATUM, *Hook.*—p. 59.

Fertile frond; *nat. size.* Fig. 1. Portion of a fertile pinna;  
*magnified.* Fig. 2. Single sorus; *magnified.*



TAB. CCXXXII.

ASPIDIUM (EUASPIDIUM) LOBBII, Hook.—p. 59.

Fertile frond; *nat. size*. Fig. 1. Portion of a pinna, with sori, and showing the venation; *magnified*. Fig. 2. Smaller portion of the same; *more magnified*.



TAB. CCXXXIII.

A. ASPIDIUM (POLYSTICHUM) MELANOCHLAMYS, *Fée.*—p. 35.

Fig. 1. Portion of a caudex, base of a stipes, and portion of a fertile frond: *nat. size.* Fig. 2. Fertile pinnule. Fig. 3. Two segments of a fertile pinnule. Fig. 4. Involucre; *more or less magnified.*

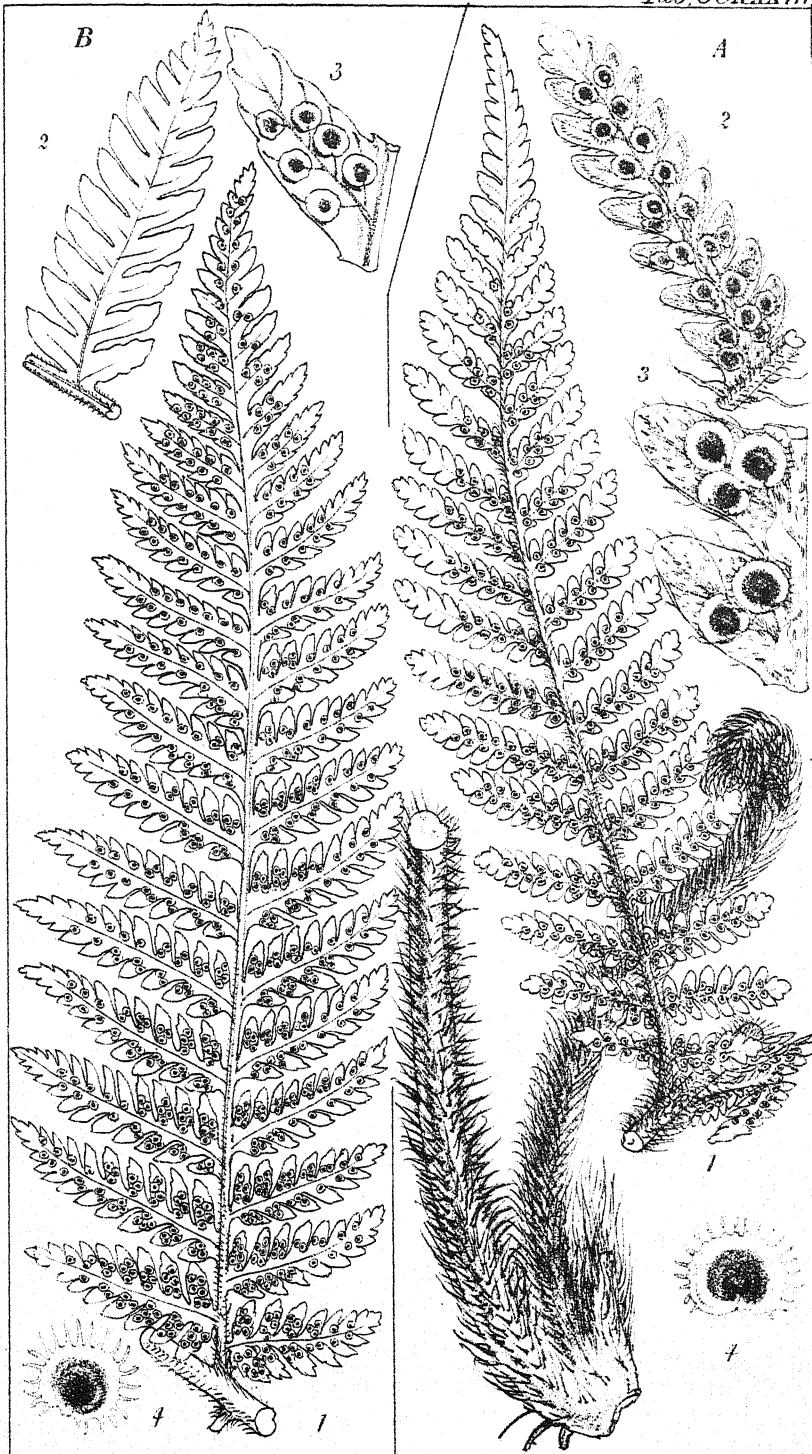
B. ASPIDIUM (POLYSTICHUM) MELANOSTICTUM, *Kze.*—p. 34.

Fig. 1. Portion of a fertile frond; *nat. size.* Fig. 2. Upper side of a pinnule; *magnified.* Fig. 3. Under side of a fertile pinnule; *magnified.* Fig. 4. Involucre; *more magnified.*

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N.B.—It is requested that, at page 34 of this volume, "TAB. CCXXXIII. A." may be corrected to TAB. CCXXXIII. B.; and that, at page 35, "TAB. CCXXXIII. B." be corrected to TAB. CCXXXIII. A.

*The former references to TAB. CCXXXIII. to be cancelled, and this leaf substituted.*

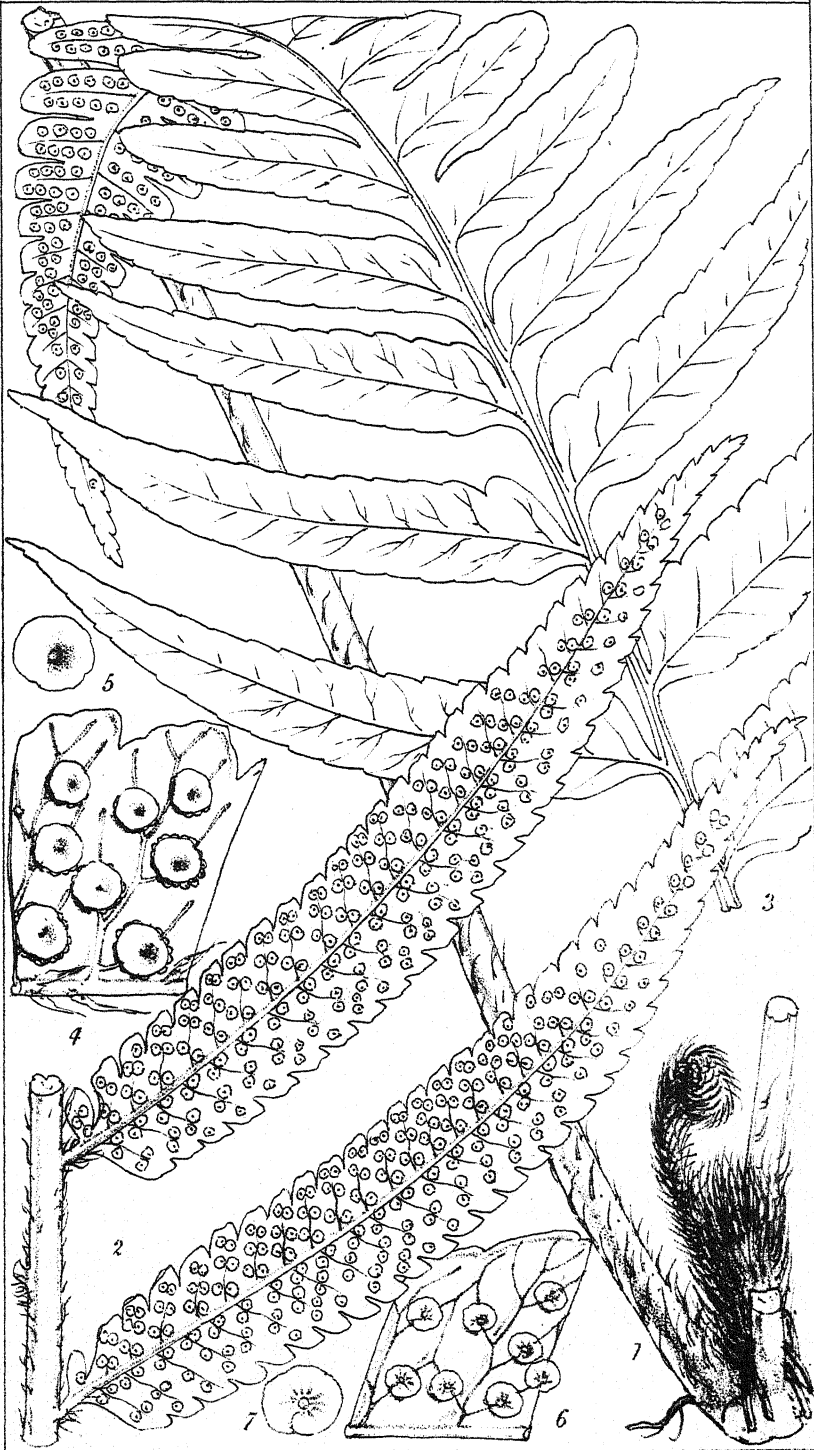




TAB. CCXXXIV.

ASPIDIUM (CYRTOMIUM) ABBREVIATUM, *Schrad.*—p. 37.

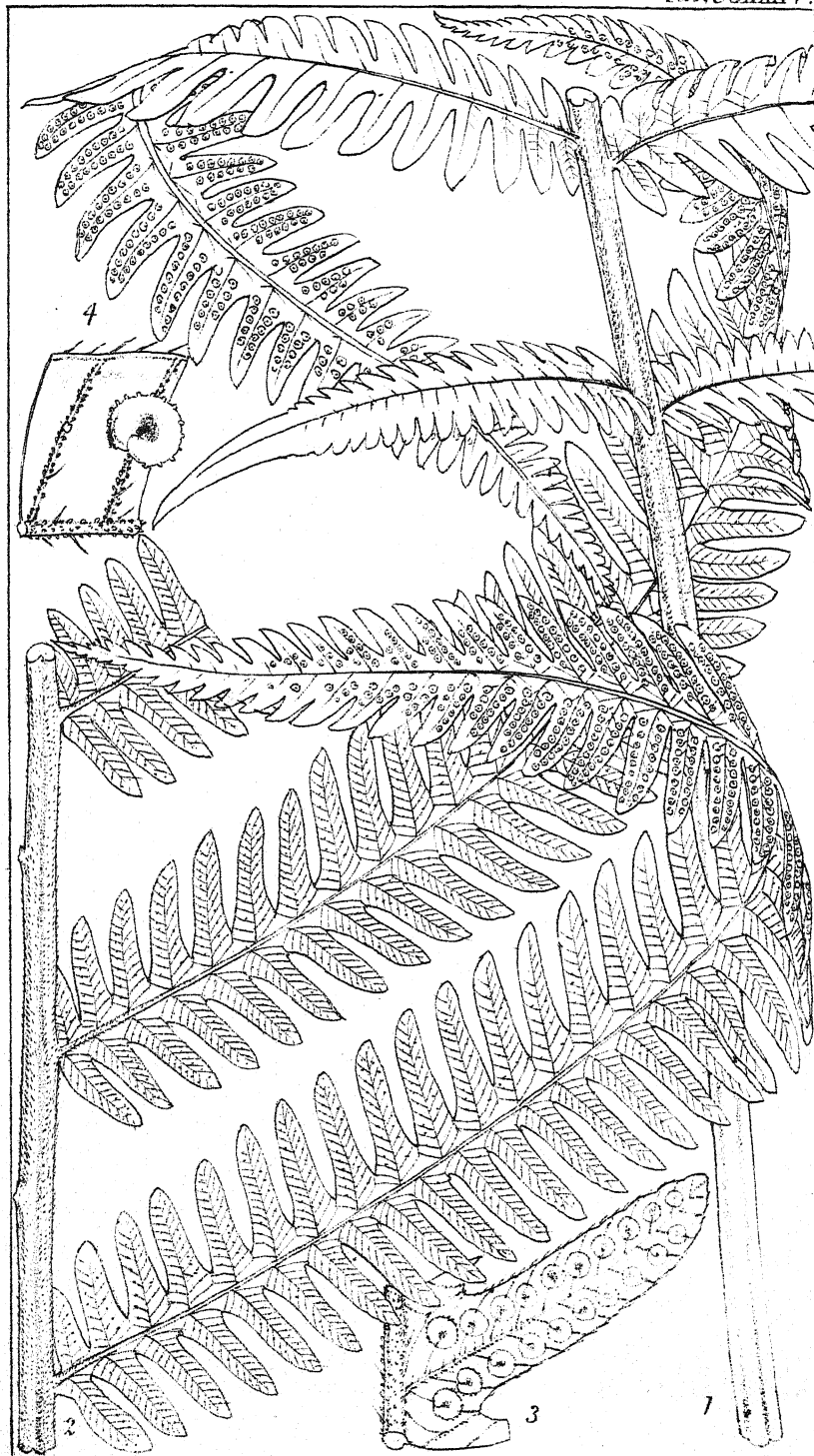
Fig. 1, 2, and 3. Portions of a caudex, stipes, and fertile frond ; *nat. size.* Fig. 4. Portion of a fertile pinna, with free venation, and involucre. Fig. 5. Involucre. Fig. 6. Portion of a fertile pinna, with anastomosing venation. Fig. 7. Involucre from the same ; *magnified.*



TAB. CCXXXV.

ASPIDIUM (CYRTOMIUM) NEPHRODIOIDES, *Hook.*—p. 42.

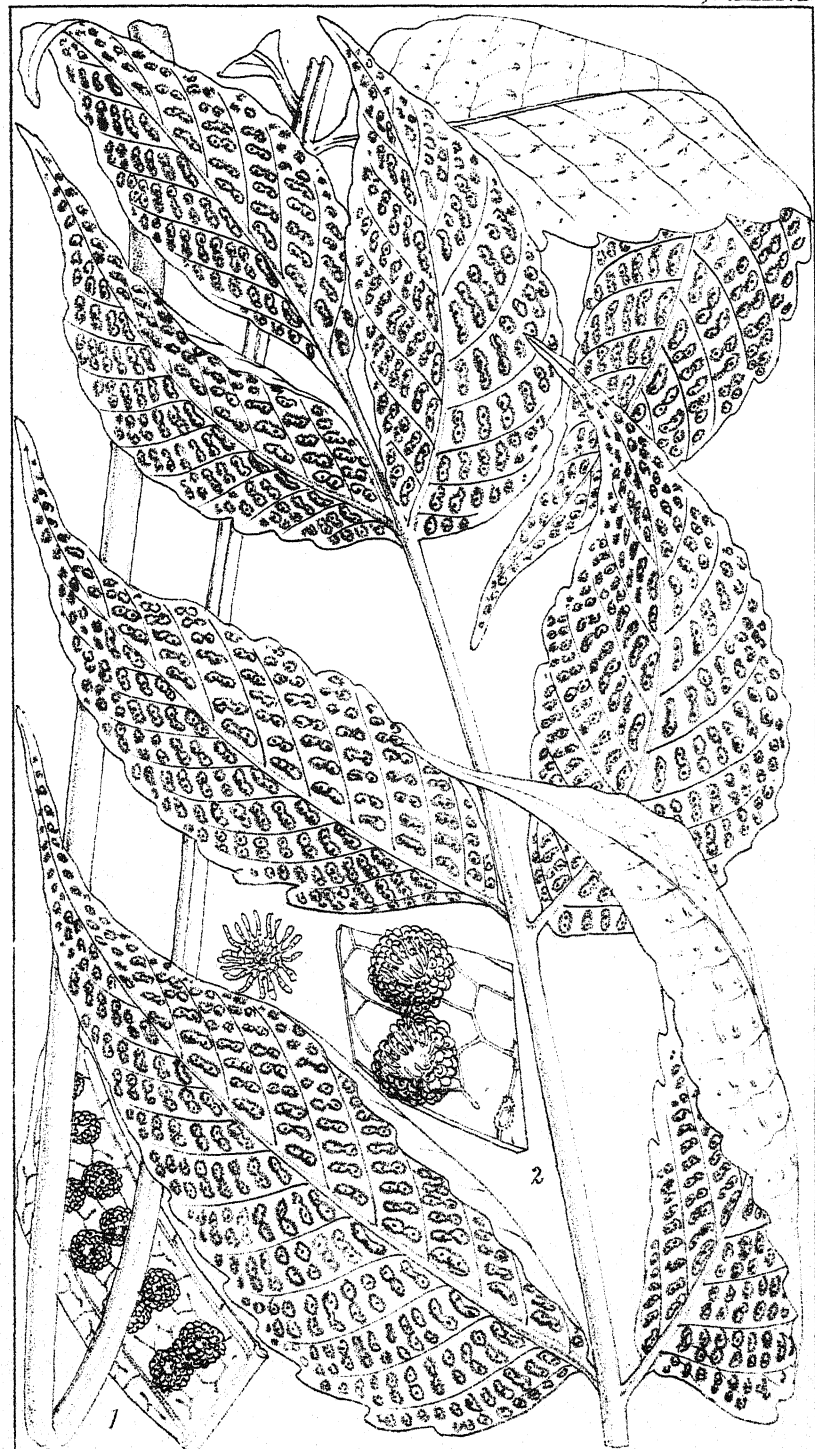
Fig. 1 and 2. Portions of a fertile frond; *nat. size.* Fig. 3. Portion of a fertile pinna, with some involucre aspidioid. Fig. 4. Sorus with lastreoid involucre; *magnified.*



TAB. CCXXXVI.

ASPIDIUM (CYRTOMIUM) TEIJSMANNIANUM. Hook.—p. 41.

Stipes and frond of a fertile plant; *nat. size.* Fig. 1. Portion of a pinna, showing the venation and sori; *magnified.* Fig. 2. Smaller portion of a pinna; and Fig. 3. Involucre (showing it to be deeply ciliated); *more magnified.*



TAB. CCXXXVII.

ASPIDIUM (POLYSTICHUM) FENICULACEUM, *Hook.*—p. 36.

Fig. 1. Stipes; and Fig. 2. Small portion of a fertile frond;  
*nat. size.* Fig. 3. Pinnule; Fig. 4. Segments of a pinnule;  
Fig. 5. Smaller segment of a pinnule, with sorus; and  
Fig. 6. Involucre; *all more or less magnified.* (The involu-  
cres are often more orbicular than here represented.)







TAB. CCXXXVIII.

NEPHRODIIUM (PLEOCNEMIA) ARISTATUM, *Hook.*—p. 62.

Fig. 1. Caudex and portion of a stipes; Fig. 2. Fertile frond;  
and Fig. 3. Pinnæ from another frond; *nat. size.* Fig. 4.  
Portion of a pinna, showing the venation, with sori; *magnified.* Fig. 5. Involucre; *more magnified.*

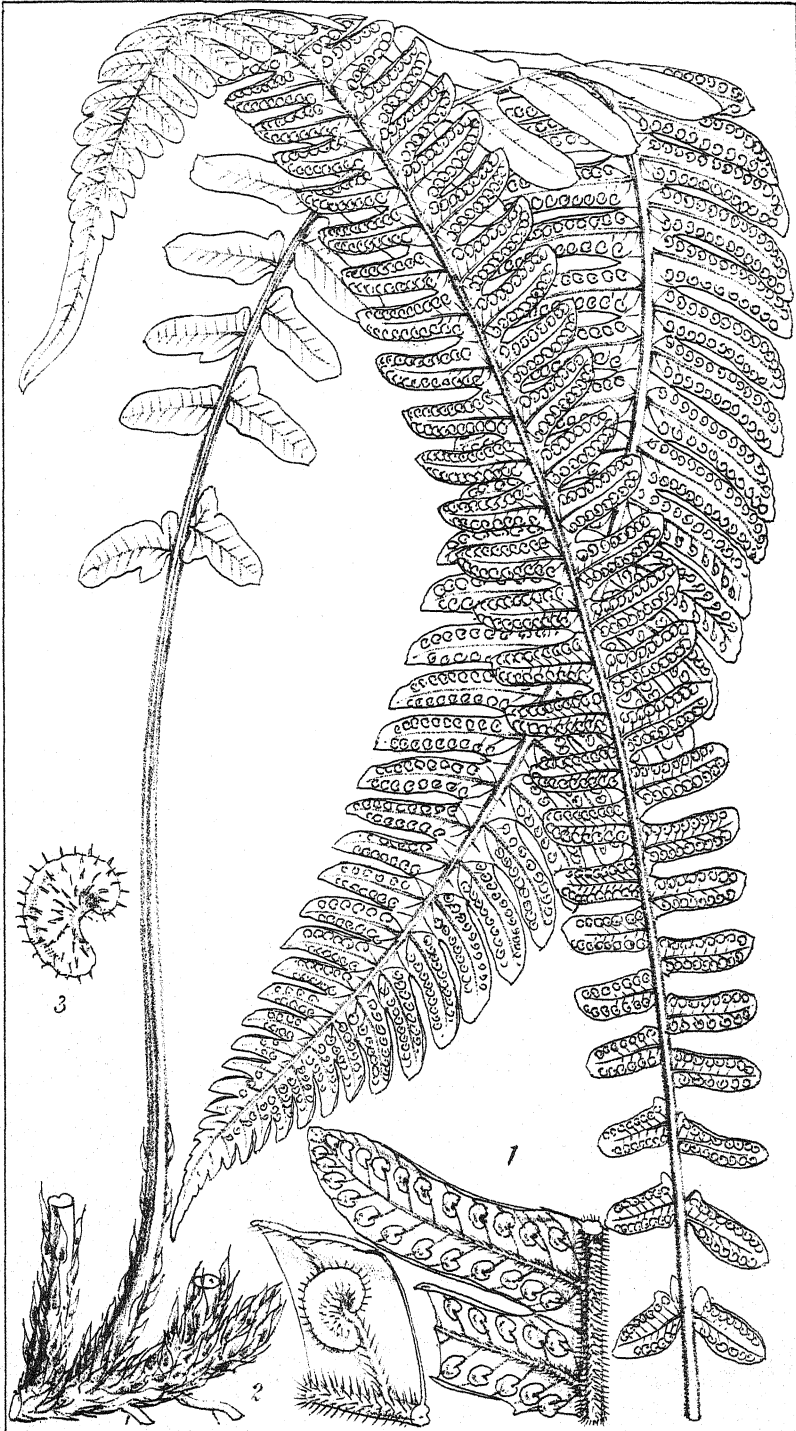


TAB. CCXXXIX.

NEPHRODium (EUNEPHRODium) WRIGHTII, *Hook.*—p. 64.

Portion of a caudex, stipes, and fertile fronds; *nat. size.* Fig.

1. Fertile segments; *magnified.* Fig. 2 and 3. Sori;  
*more magnified.*



TAB. CCXL.

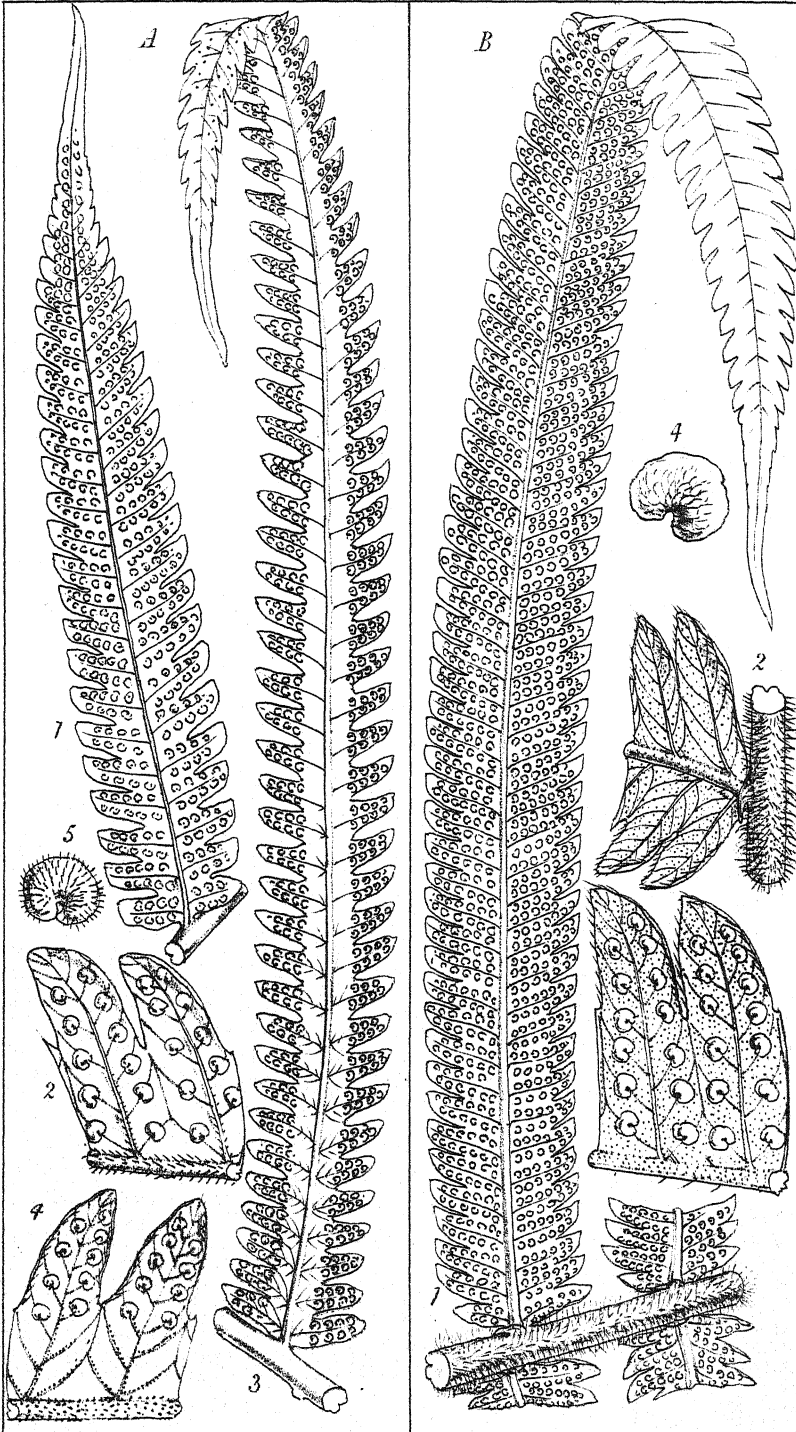
A. NEPHRODium (EUNEPHRODium) EXTENSUM, Bl.—p. 72.

Fig. 1 and 3. Single pinnæ, two varieties, with sori; *nat. size.*

Fig. 2. Fertile segments of fig. 1; and Fig. 4. Fertile segments of fig. 3; *magnified.* Fig. 5. Involucre; *more magnified.*

B. NEPHRODium (EUNEPHRODium) HIRSUTUM, J. Sm.—p. 70.

Fig. 1. Single fertile pinna, seen from beneath, and a portion of the rachis; and Fig. 2. Base of a pinna, seen from above, and showing the gland on the rachis; *nat. size.* Fig. 3. Two fertile segments; *magnified.* Fig. 4. Involucre; *more magnified.*



TAB. CCXLI.

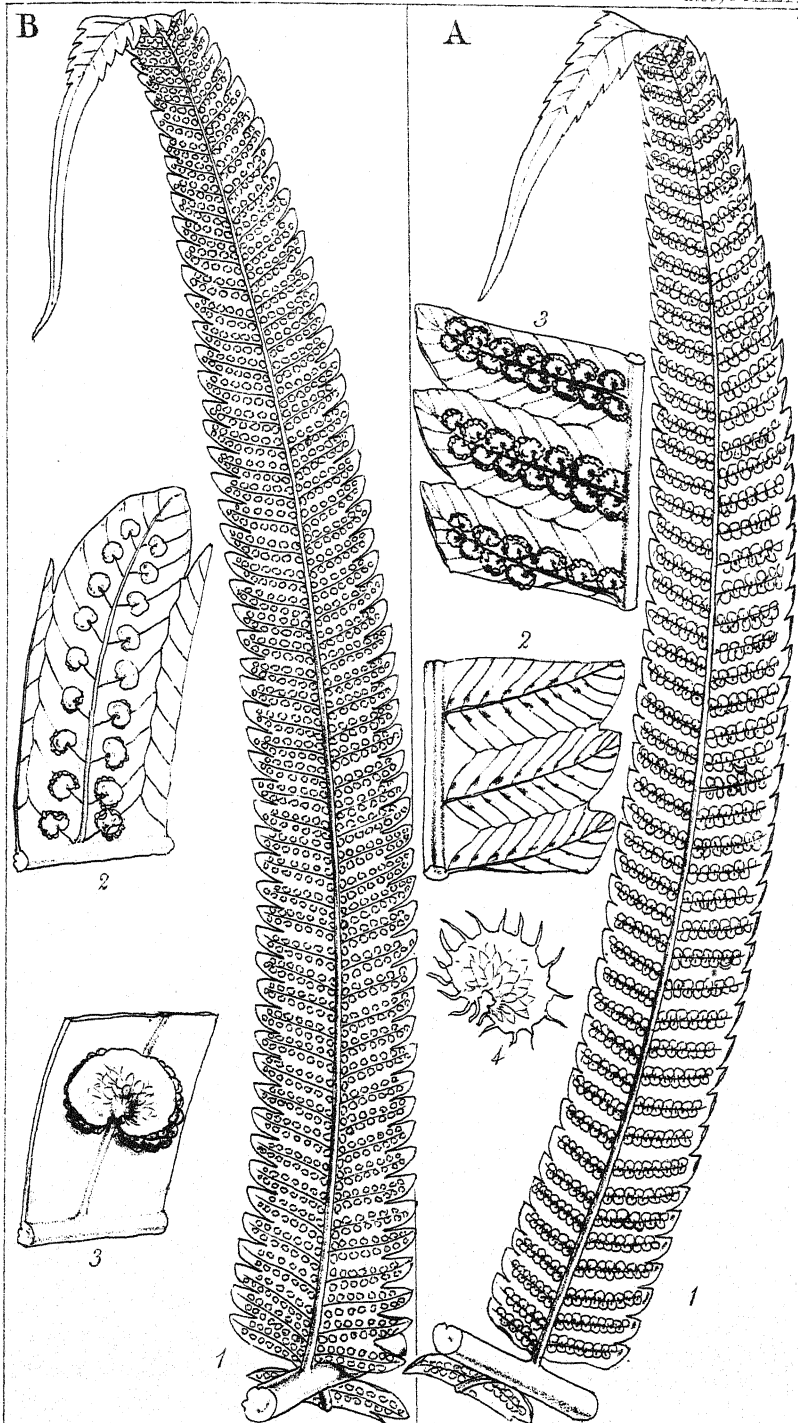
A. NEPHRODIUM (EUNEPHRODIUM) CYATHEOIDES, *Klf.*—p. 76.

Fig. 1. Fertile pinna; *nat. size.* Fig. 2. Portion of a pinna, showing the venation; and Fig. 3. Portion of a pinna, with sori; *magnified.* Fig. 4. Involucre; *more magnified.*

B. NEPHRODIUM (EUNEPHRODIUM) ABRUPTUM, *Pr.*—p. 77.

Fig. 1. Fertile pinna; *nat. size.* Fig. 2. Portion of a pinna with sori; *magnified.* Fig. 3. Sorus; *more magnified.*







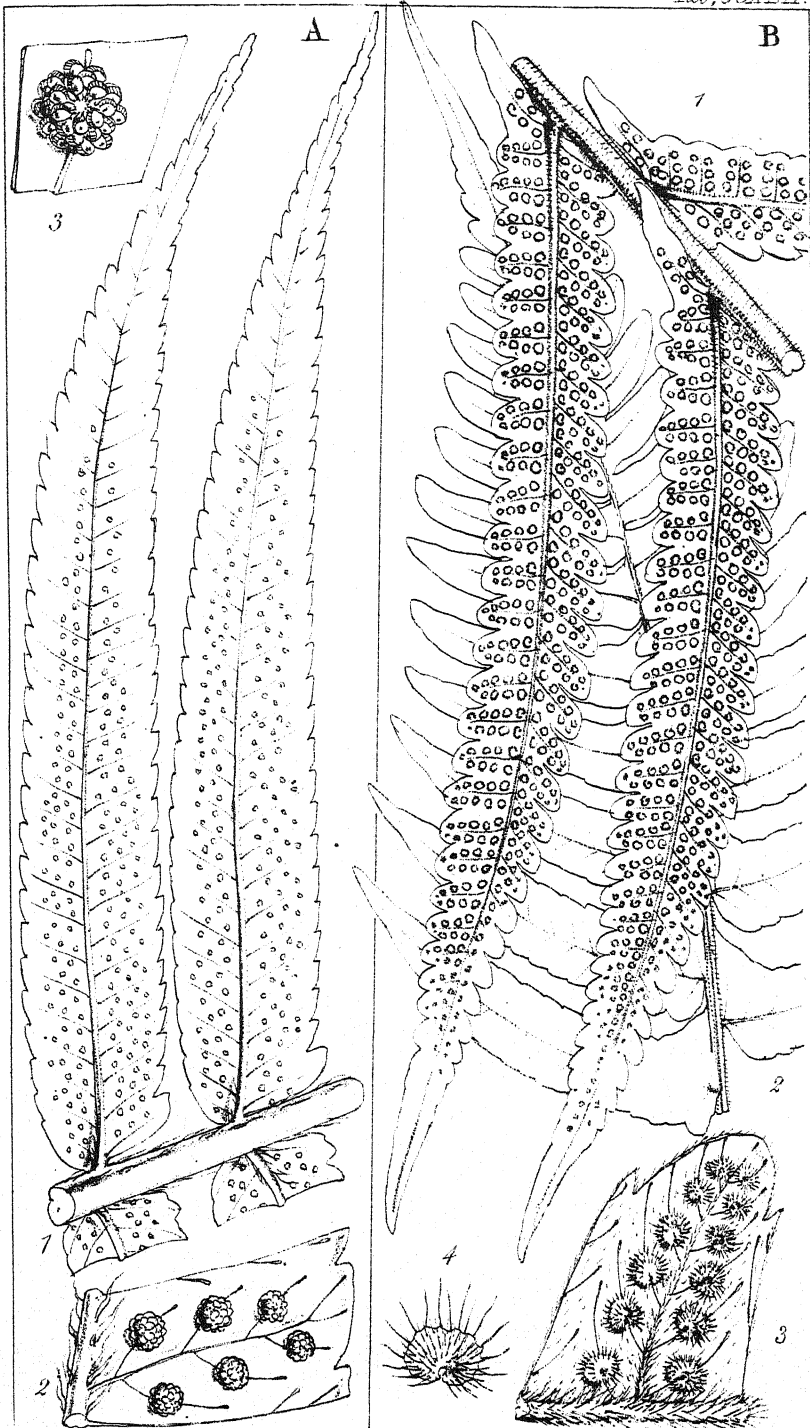
TAB. CCXLII.

A. NEPHRODIIUM (LASTREA) IMRAYANUM, *Hook.*—p. 86.

Fig. 1. Fertile pinnæ; *nat. size.* Fig. 2. Portion of a fertile pinna (involucres fuller); *magnified.* Fig. 3. Single sorus; *more magnified.*

B. NEPHRODIIUM (LASTREA) MACROTIS, *Hook.*—p. 86.

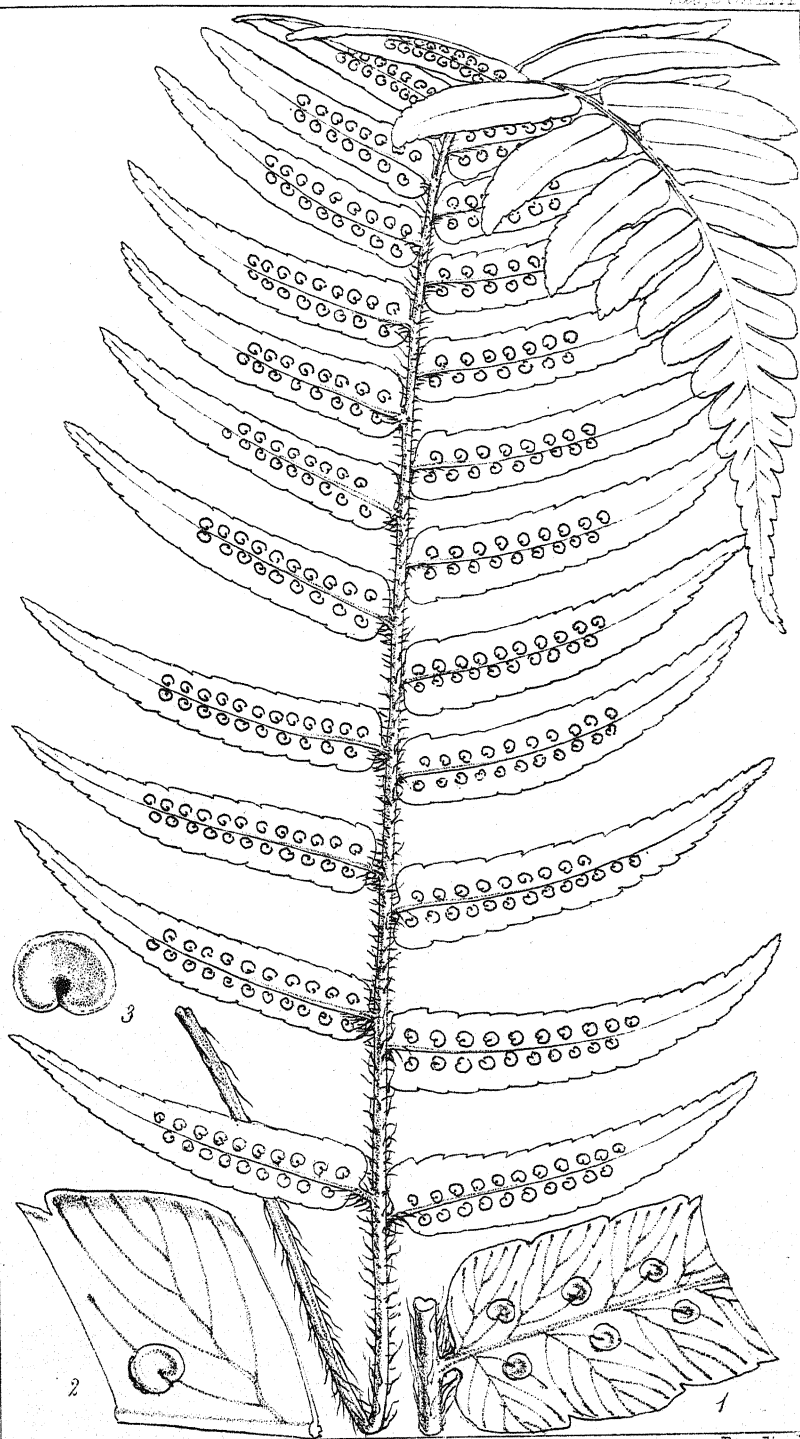
Fig. 1 and 2. Fertile portions of a frond; *nat. size.* Fig. 3. Portion of a pinna, with sori; *magnified.* Fig. 4. Involucre; *more magnified.*



TAB. CCXLIII.

NEPHRODIUM (LASTREA) DECIPIENS, *Hook.*—p. 86.

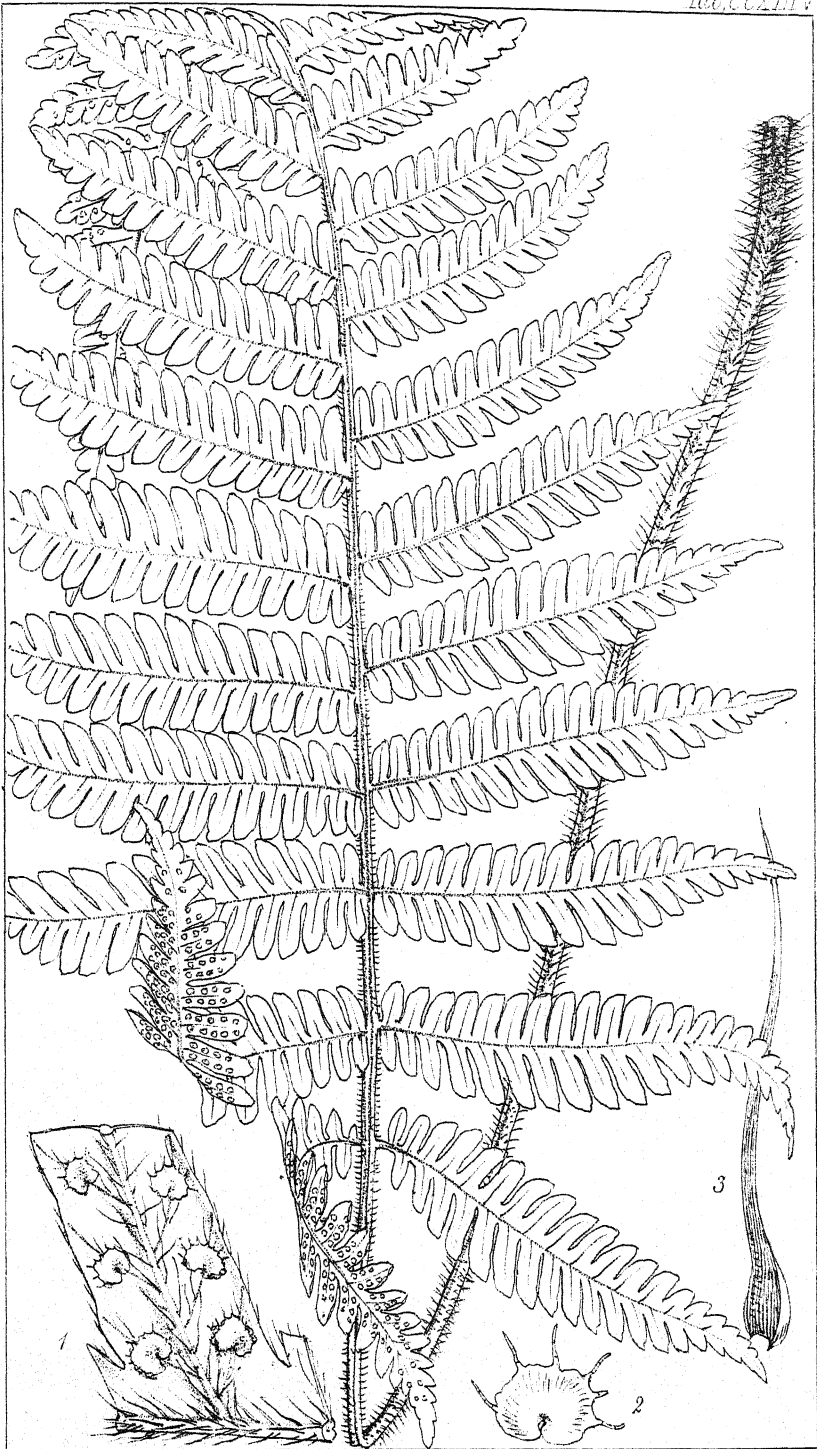
Fertile frond; *nat. size.* Fig. 1. Portion of a fertile pinna;  
*magnified.* Fig. 2. Portion of the same, *more magnified,*  
with a single sorus. Fig. 3. Involucre; *magnified.*



TAB. CCXLIV.

NEPHRODIUM (LASTREA) CRINIBULBON, *Hook.*—p. 92.

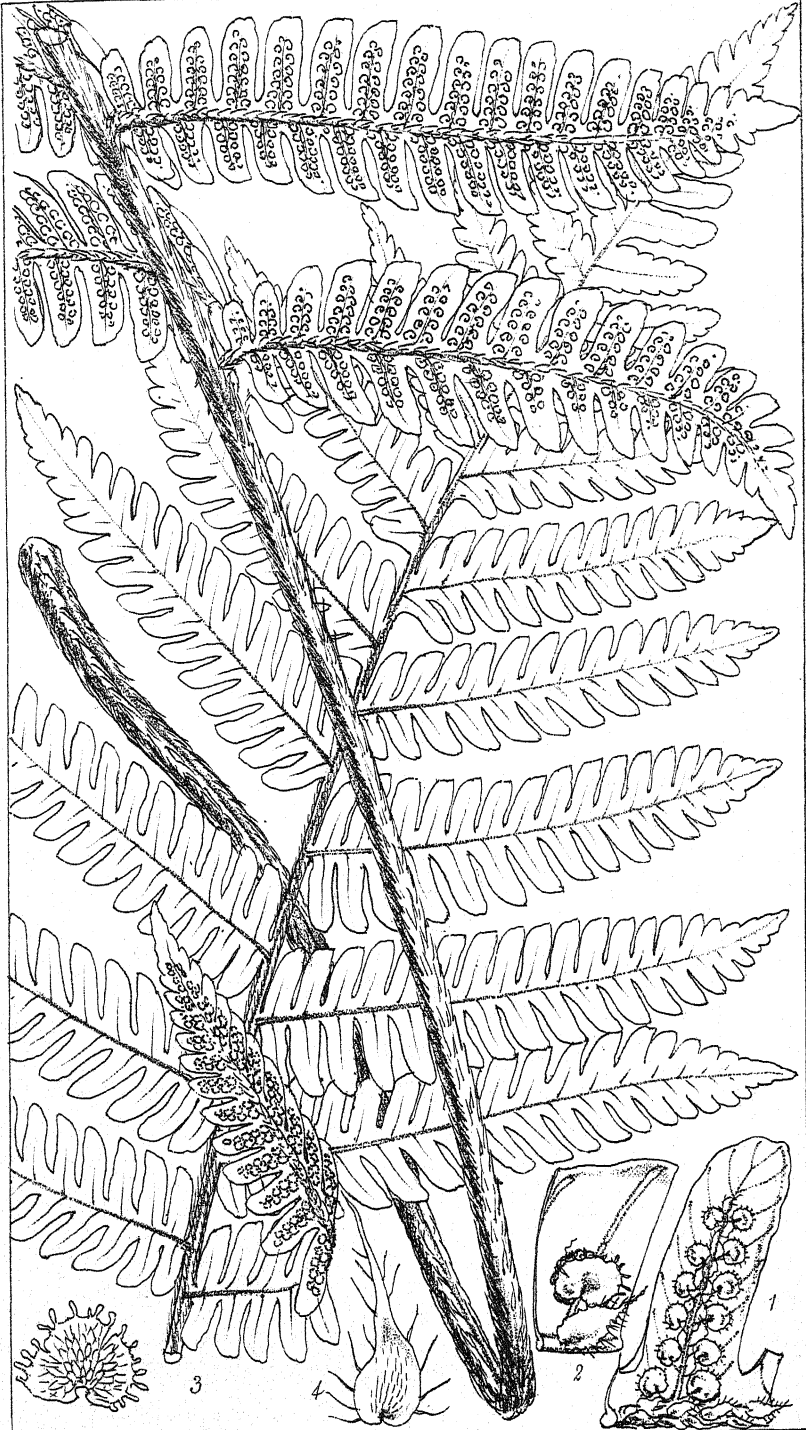
Fertile frond; *nat. size.* Fig. 1. Portion of a fertile frond;  
Fig. 2. Involucre; and Fig. 3. Hair-like scale from the  
stipes; *magnified.*



TAB. CCXLV.

NEPHRODIIUM (LASTREA) RADDIANUM, Hook.—p. 98.

Fertile frond; *nat. size.* Fig. 1. Portion of a pinna, with sori;  
*magnified.* Fig. 2. Portion of a segment, with sorus;  
*more magnified.* Fig. 3. Involucre; and Fig. 4. Scale from  
the stipes; *much magnified.*

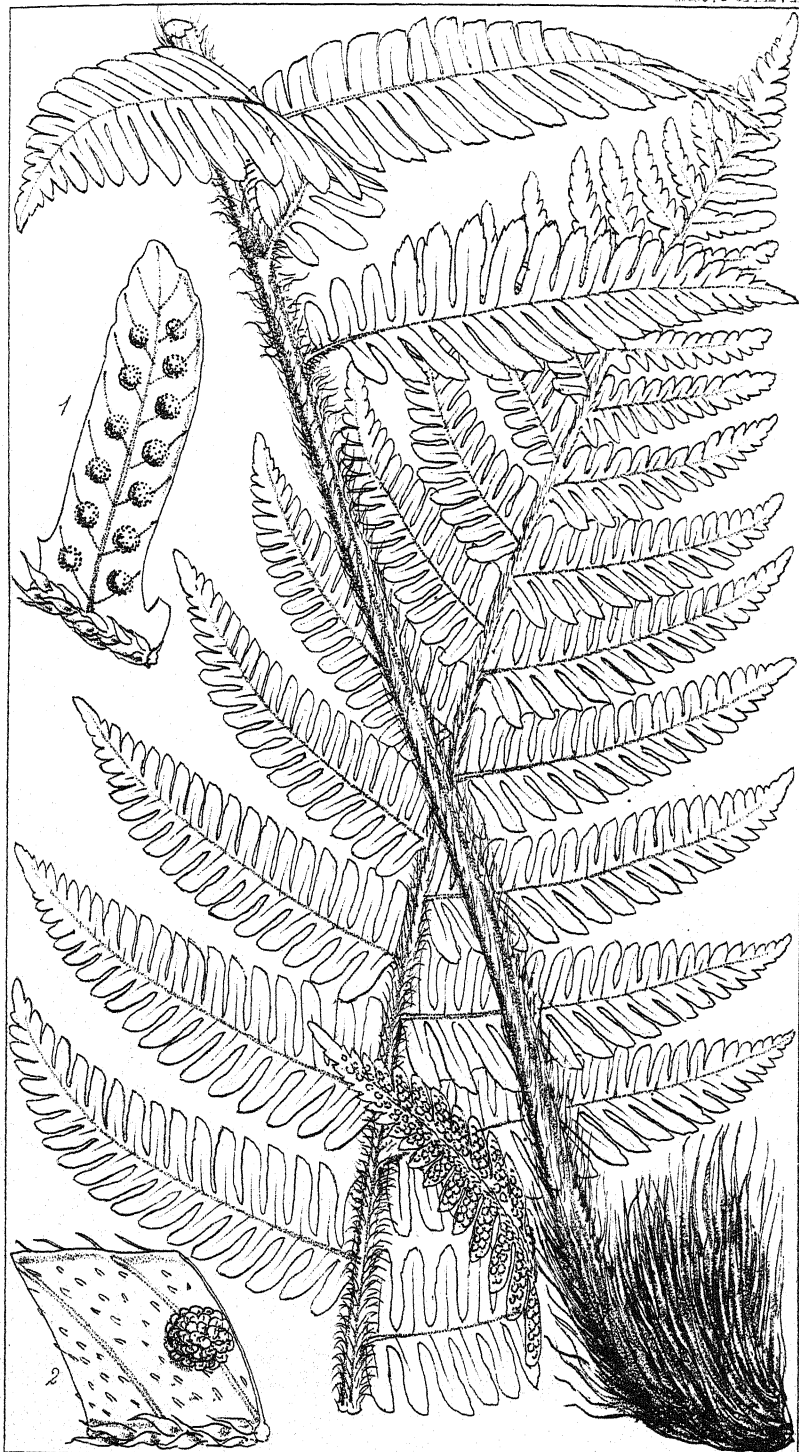




TAB. CCXLVI.

NEPHRODIIUM (LASTREA) AUREOVESTITUM, *Hook.*—p. 101.

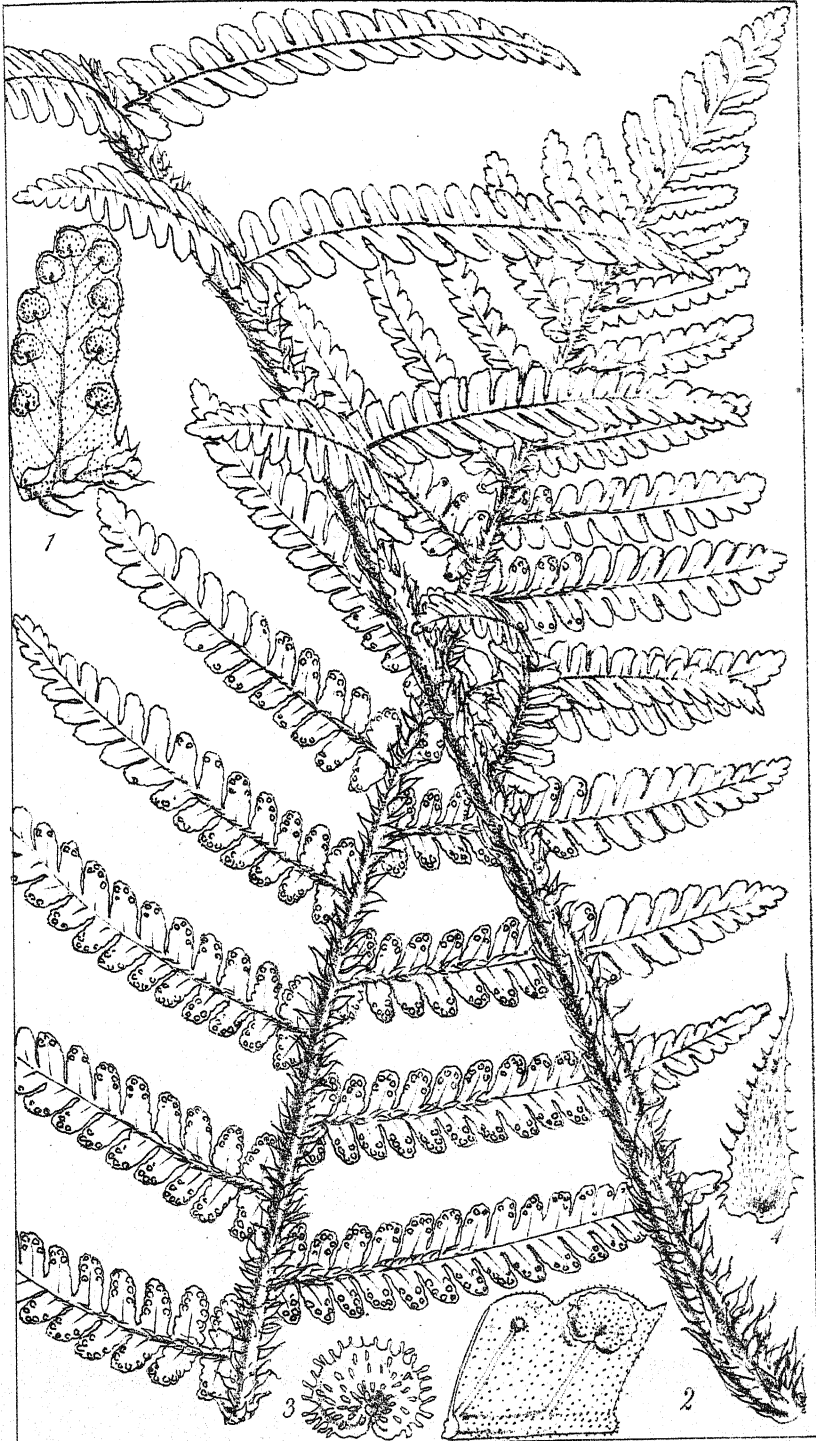
Fertile frond; *nat. size.* Fig. 1. Segment of a pinna, with sori; *magnified.* Fig. 2. Smaller portion of a segment, with a single sorus (the involucre having fallen); *more magnified.*



TAB. CCXLVII.

NEPHRODIUM (LASTREA) VELATUM, *Hook.*—p. 101.

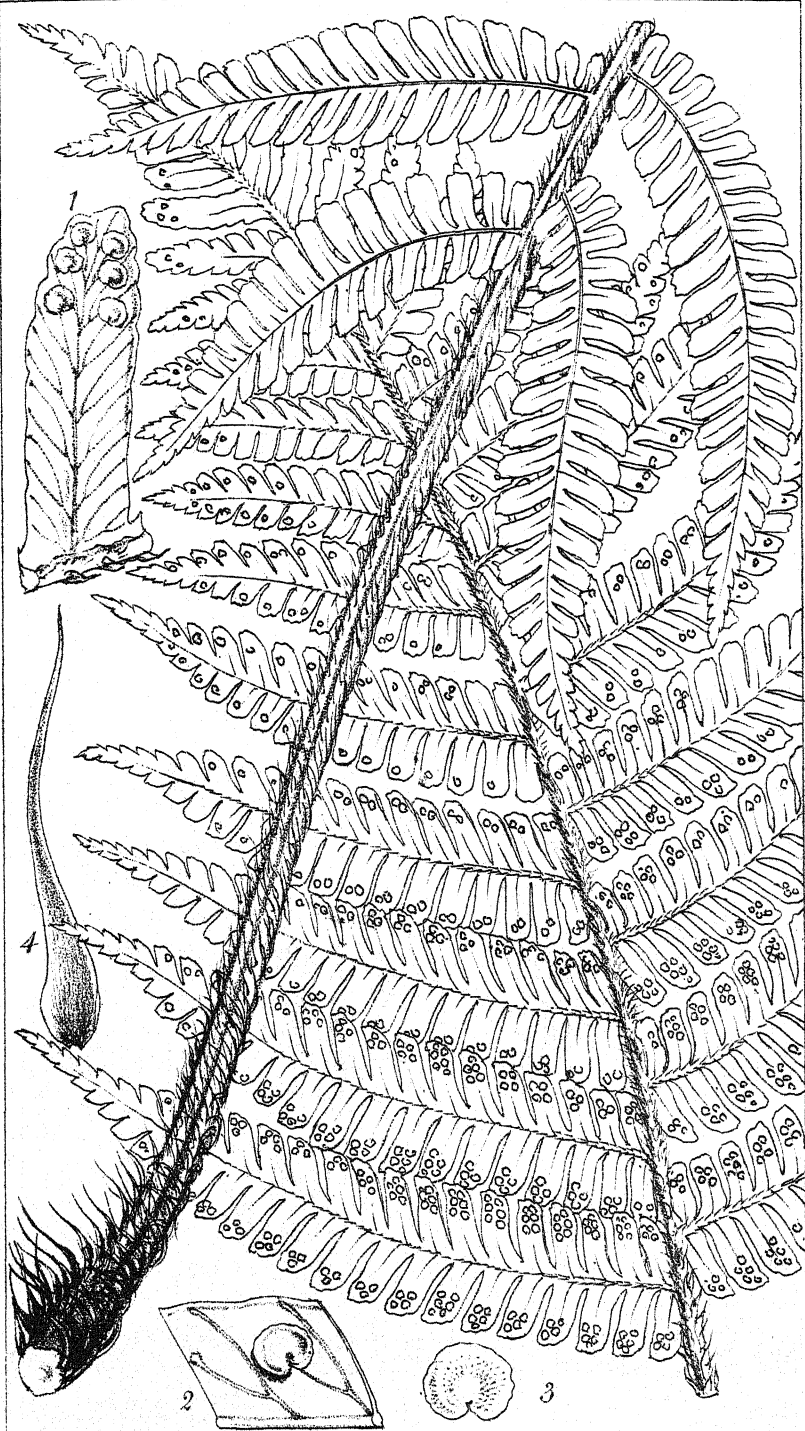
Fertile frond; *nat. size.* Fig. 1. Segment of a pinna, with sori; *magnified.* Fig. 2. Portion of segment, with a sorus; *more magnified.* Fig. 3. Involucre; and Fig. 4. Scale from the stipes; *much magnified.*



TAB. CCXLVIII.

NEPHRODIUM (LASTREA) APICIFLORUM, *Hook.*—p. 112.

Fertile frond; *nat. size.* Fig. 1. Segment of a pinna, with sori; *magnified.* Fig. 2. Portion of the same with a sorus; *more magnified.* Fig. 3. Involucre; and Fig. 4. Scale from the stipes; *much magnified.*

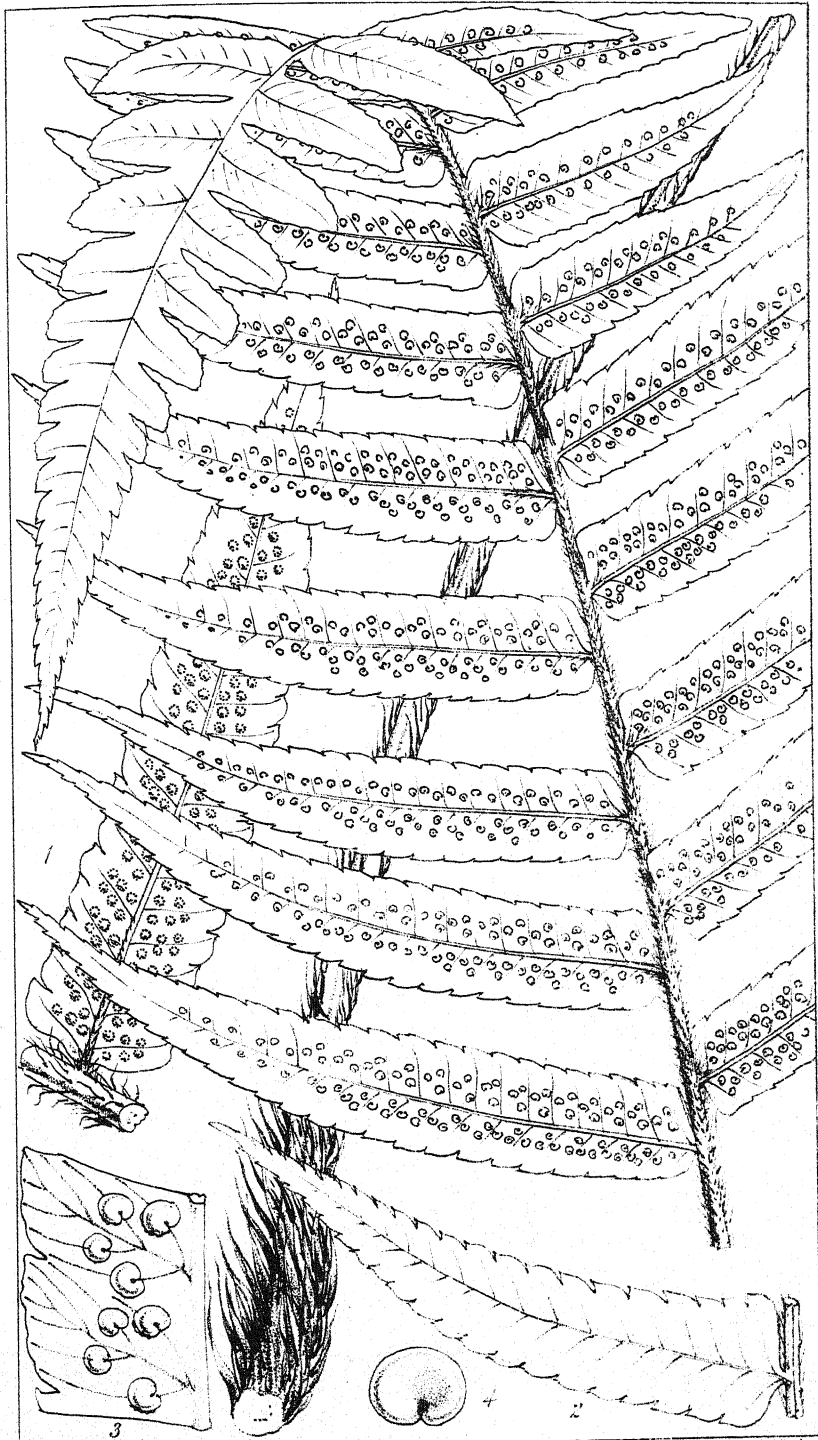


TAB. CCXLIX.

NEPHRODIUM (LASTREA) HIRTIPES, *Hook.*—p. 115.

Fig. 1. Fertile, and Fig. 2. Sterile pinna; *slightly magnified.*

Fig. 3. Portion of a fertile pinna; *more magnified.* Fig. 4.  
Involucre; *much magnified.*

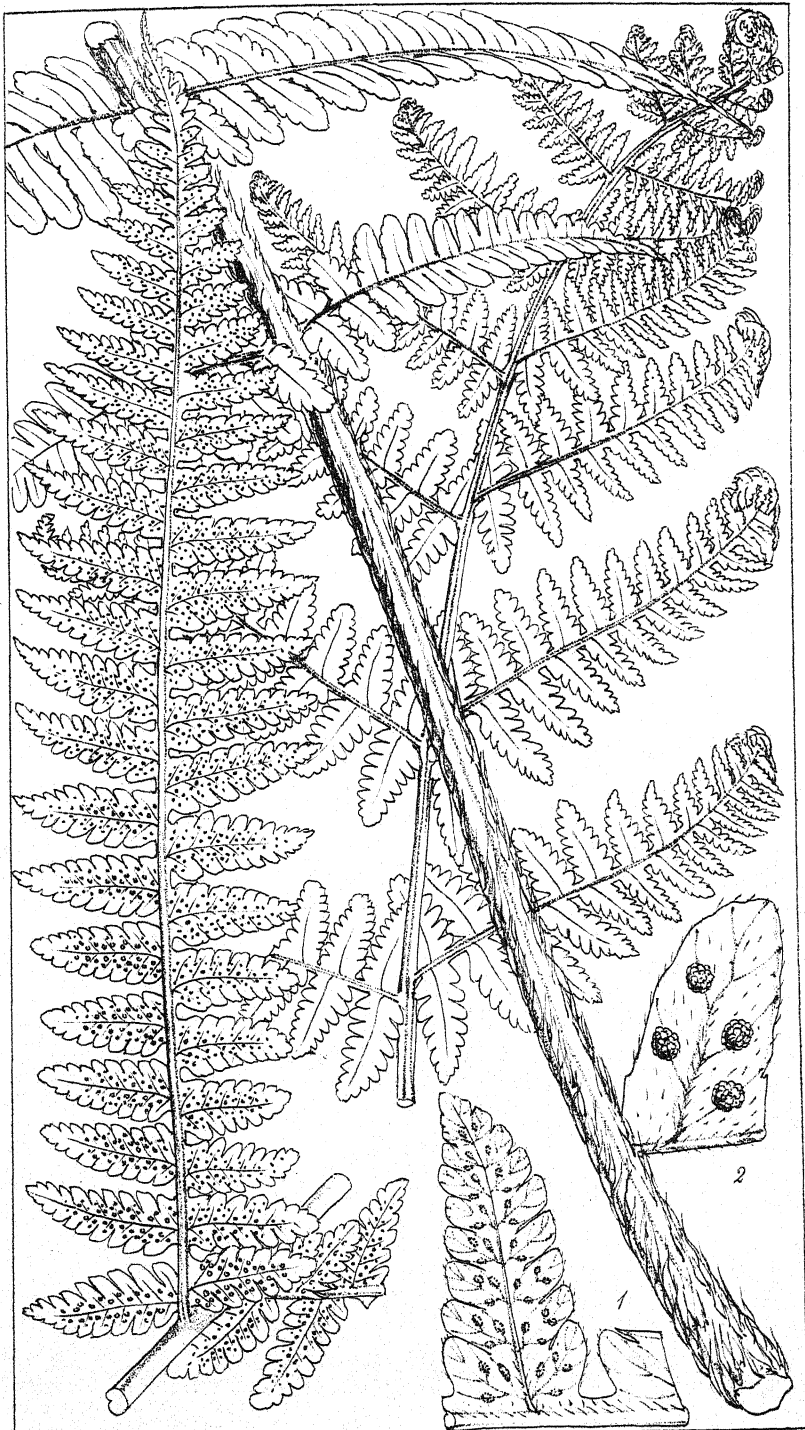




TAB. CCL.

NEPHRODIUM (LASTREA) MICROSTEGIUM, *Hook.*—p. 119.

Portions of fertile frond ; *nat. size.* Fig. 1. Pinnule of a fertile frond ; *magnified.* Fig. 2. Segment of a pinnule, with sori (the involucre having fallen) ; *more magnified.*

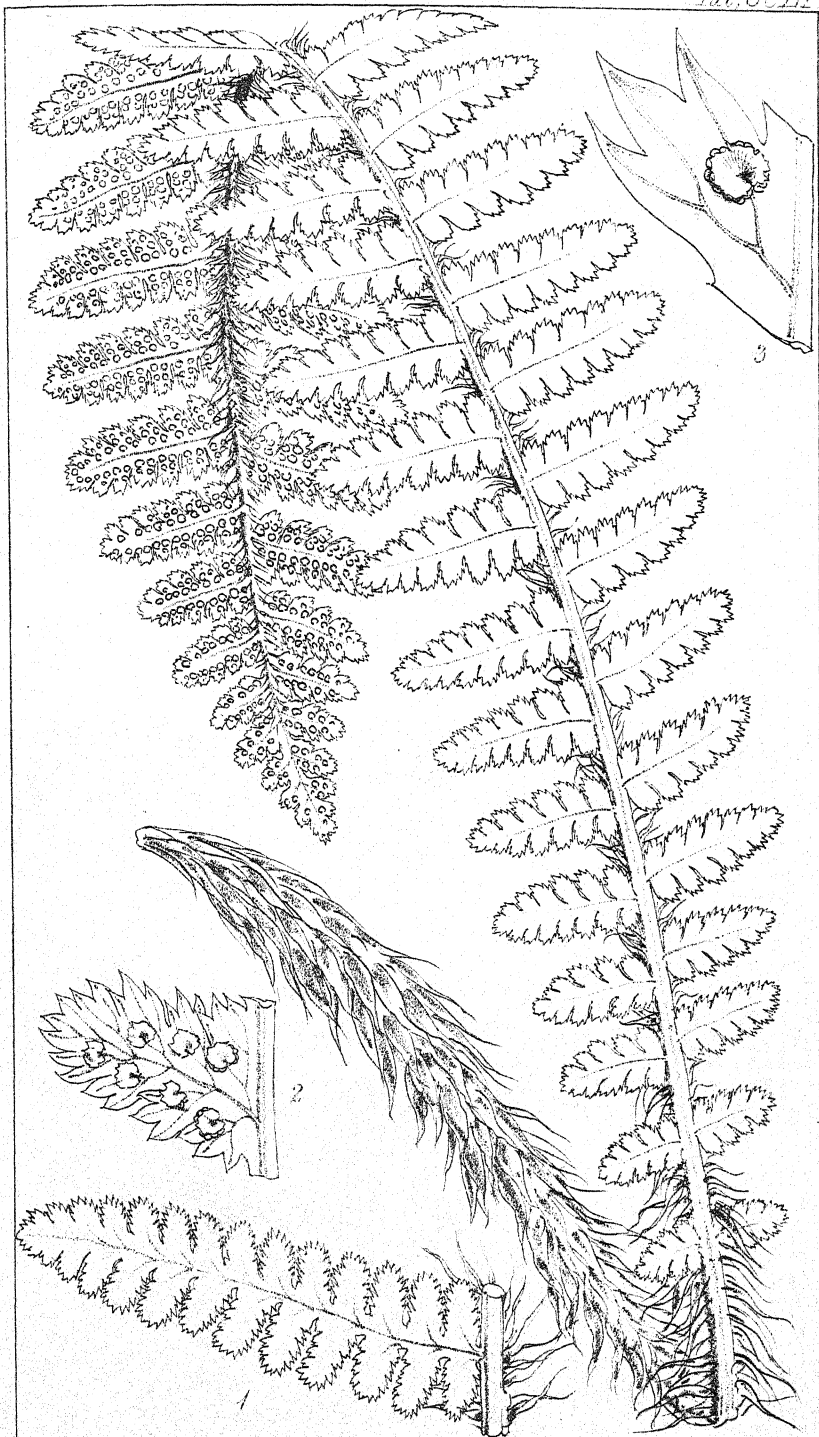


TAB. CCLI.

NEPHRODIUM (LASTREA) BRUNONIANUM, Hook.—p. 113.

Fertile frond; *nat. size*. Fig. 1. Pinna; *slightly magnified*.

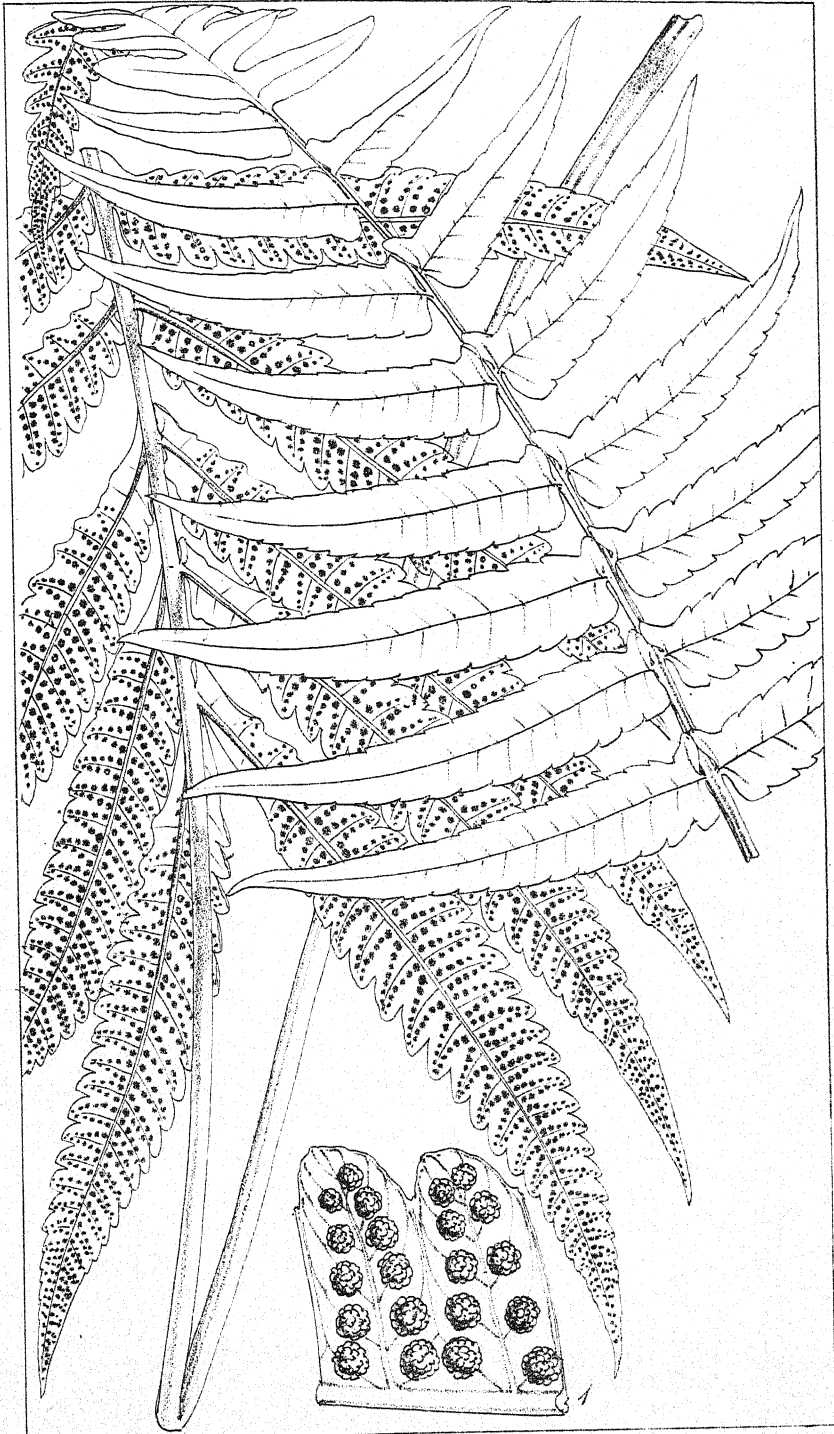
Fig. 2. Fertile segment; *more magnified*. Fig. 3. Sorus,  
with a portion of a segment; *much magnified*.



TAB. CCLII.

NEPHRODium (EUNEPHRODium) REFRACTUM, *Hook.*—p. 162.

Fertile frond; *nat. size.* Fig. 1. Portion of a fertile pinna;  
*magnified* (the involucre concealed by the capsules).

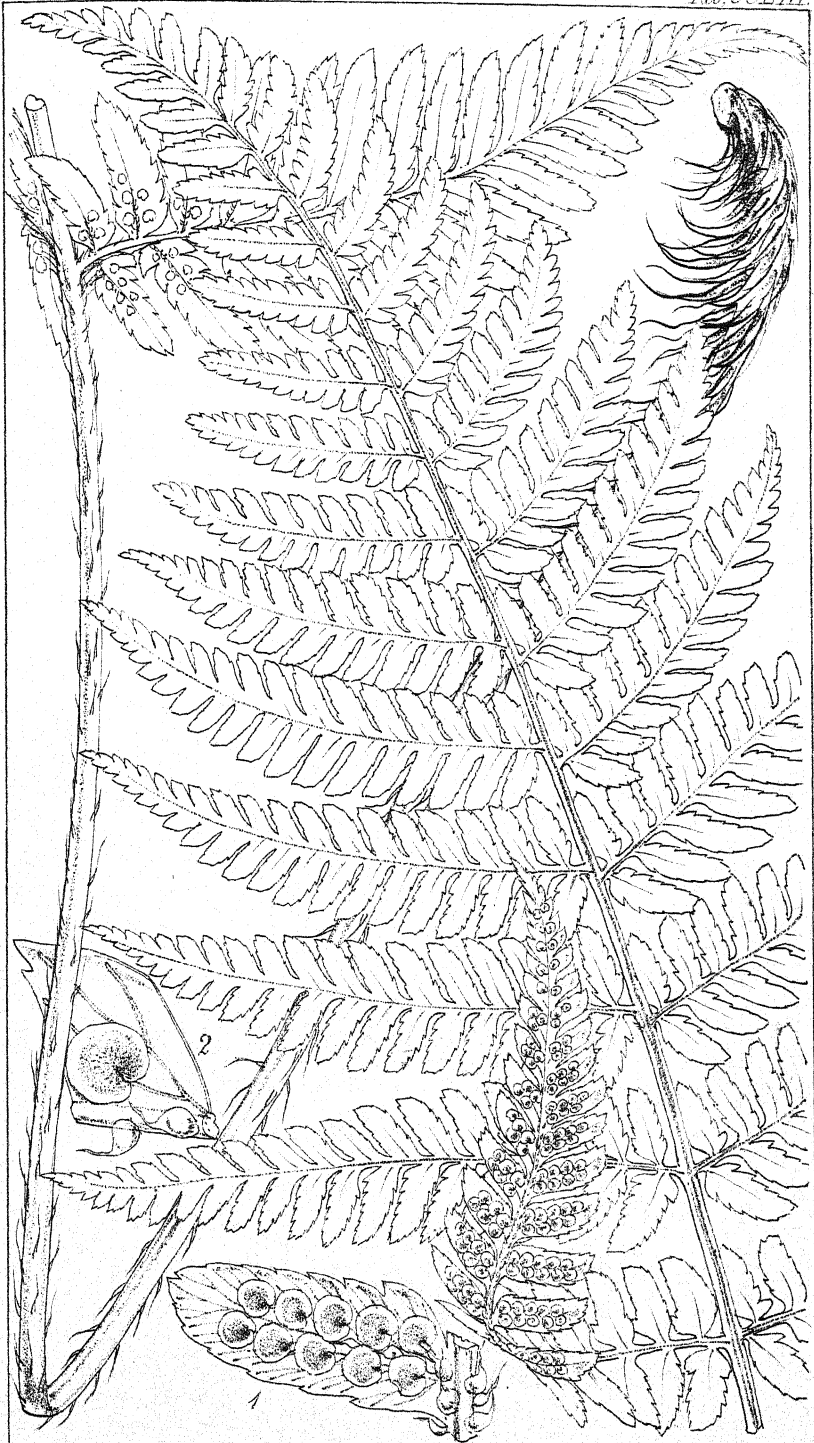


TAB. CCLIII.

NEPHRODIIUM (LASTREA) ERYTHROSORUM, *Eat.*—p. 120.

Fertile frond; *nat. size.* Fig. 1. Fertile pinna; *magnified.*

Fig. 2. Portion of a pinna, with involucre; *more highly magnified.*

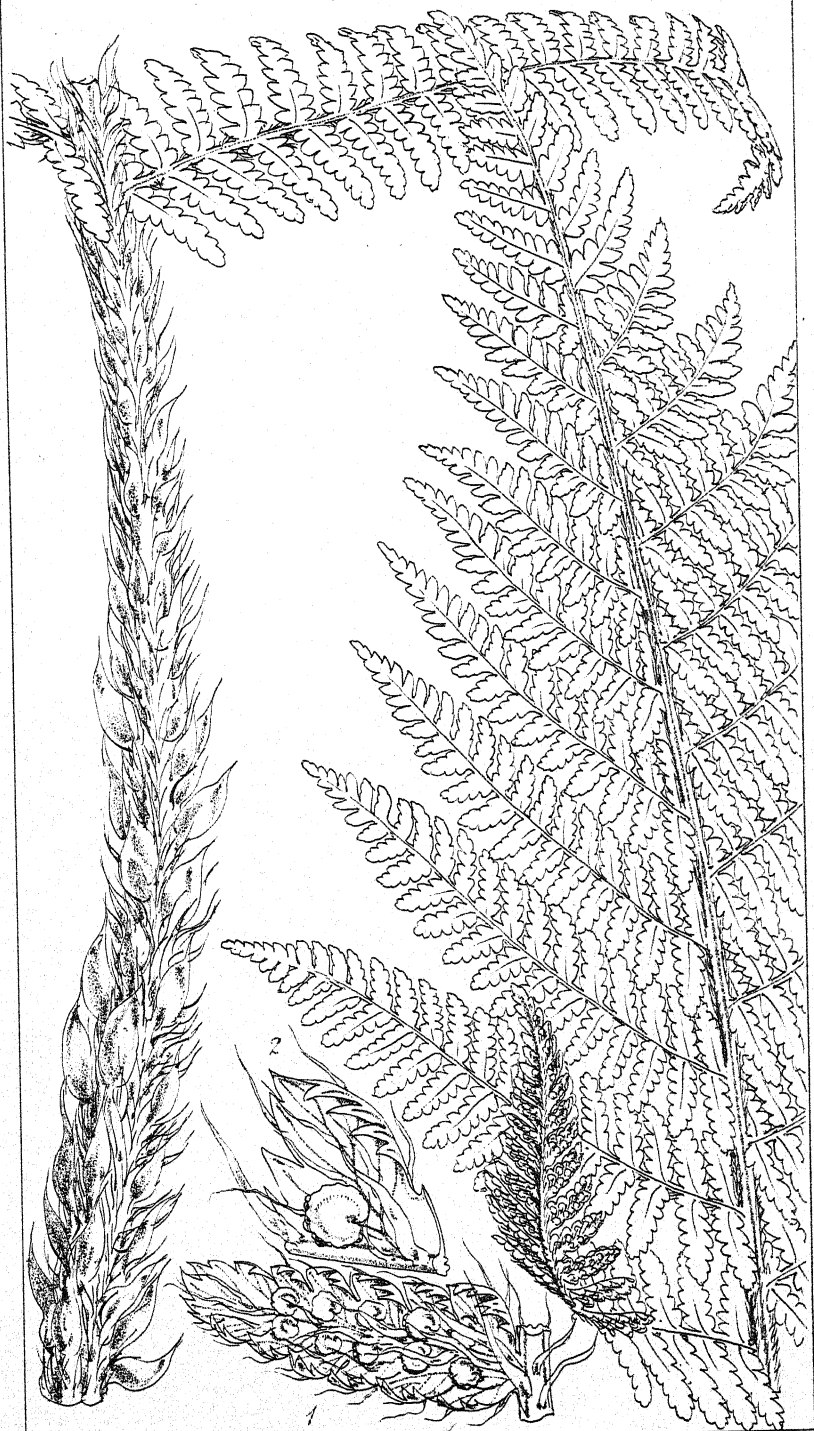




TAB. CCLIV.

NEPHRODIUM (LASTREA) FALCONERI, *Hook.*—p. 123.

Stipes and portion of a fertile frond; *nat. size.* Fig. 1. Fertile pinnule; *magnified.* Fig. 2. Portion of a pinnule, with involucre; *more magnified.*

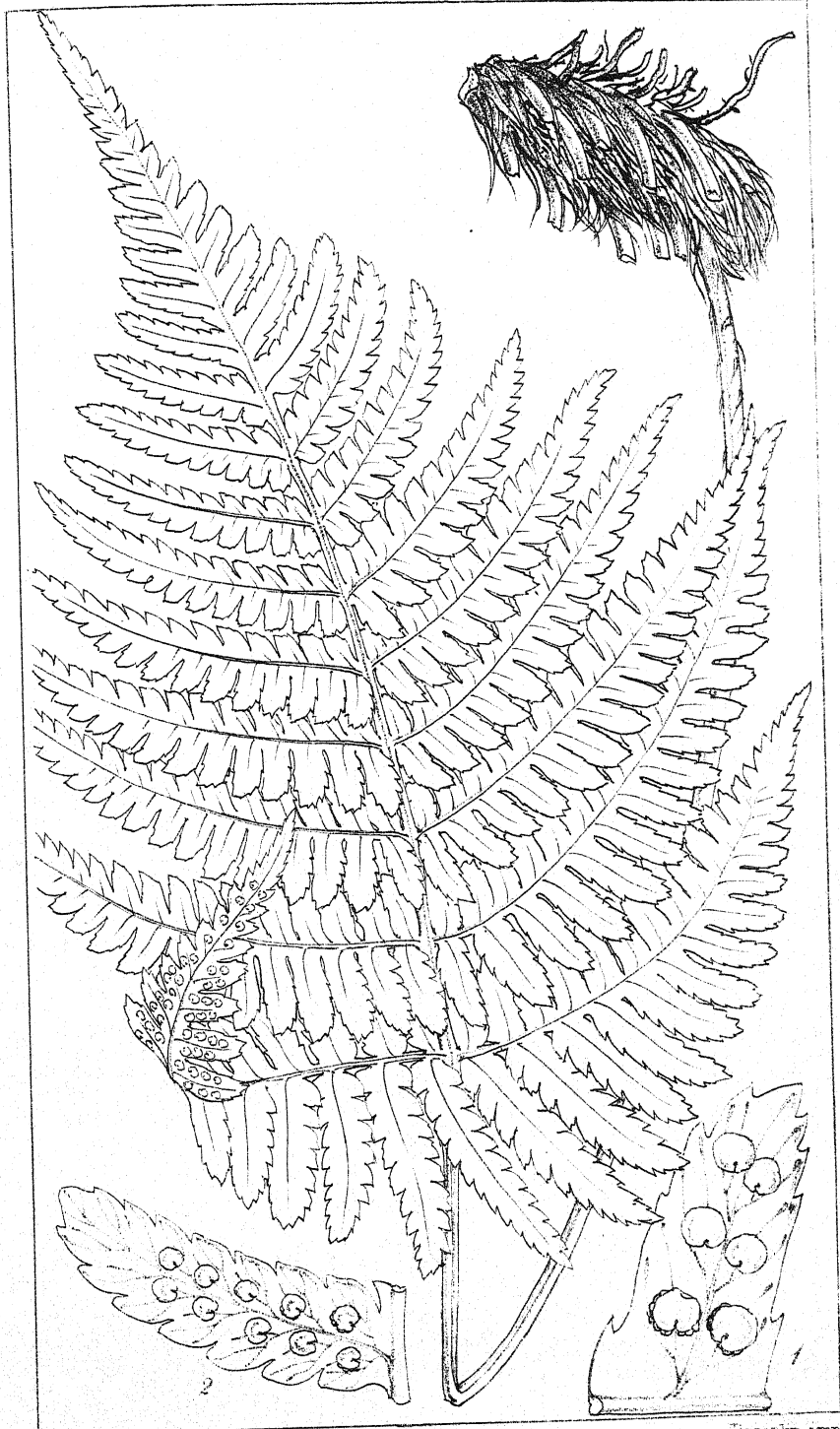


TAB. CCLV.

NEPHRODIUM (LASTREA) NAPOLEONIS, *Bory.*—p. 123.

Fertile frond; *nat. size.* Fig. 1. Fertile segment; *magnified.*

Fig. 2. Fertile pinnule; *less magnified.*

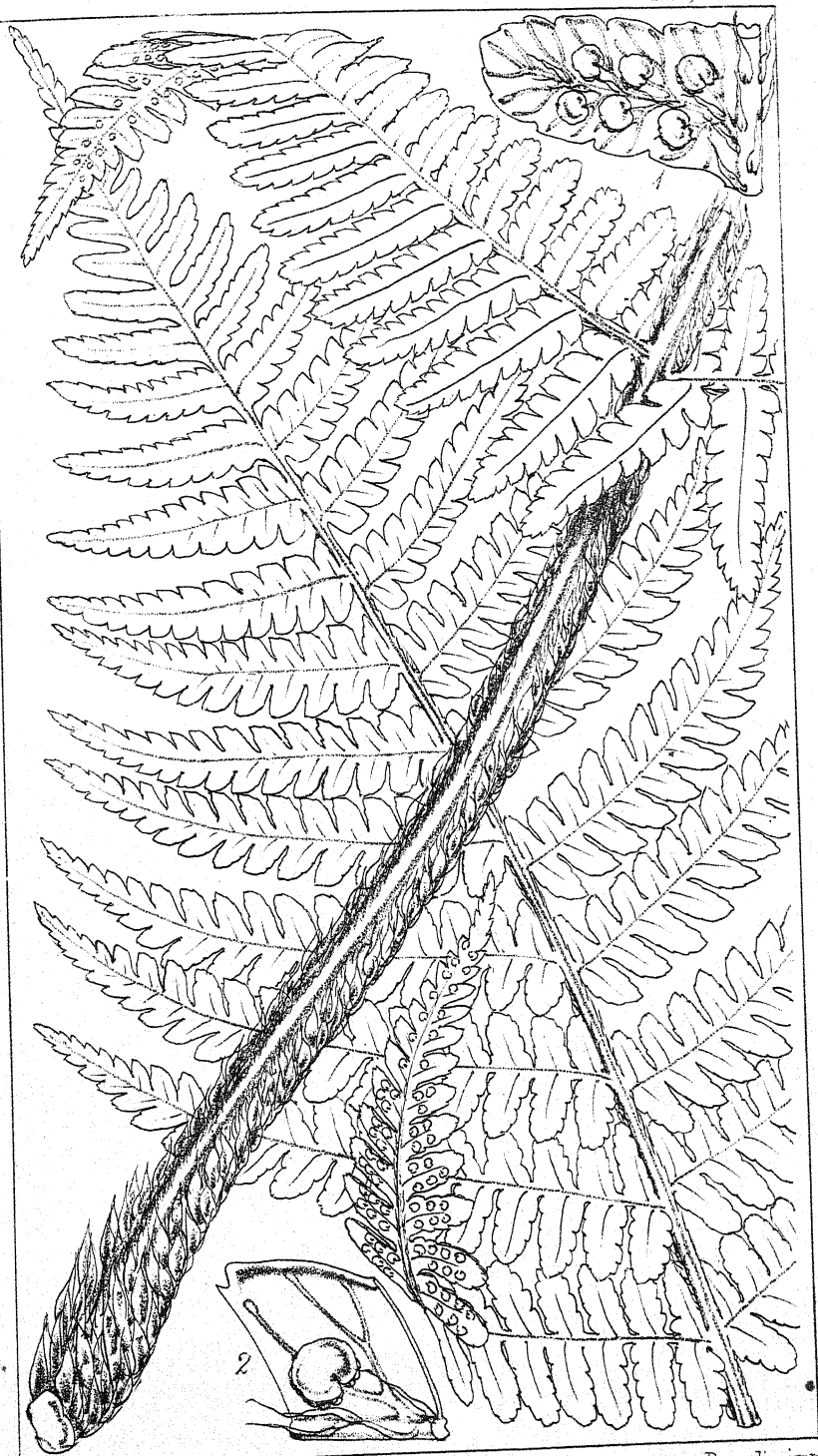


TAB. CCLVI.

NEPHRODIIUM (LASTREA) COGNATUM, *Hook.*—p. 123.

Portions of the stipes of the fertile frond; *nat. size.* Fig. 1.

Fertile pinnule; *magnified.* Fig. 2. Portion of a pinnule,  
with sorus; *more magnified.*

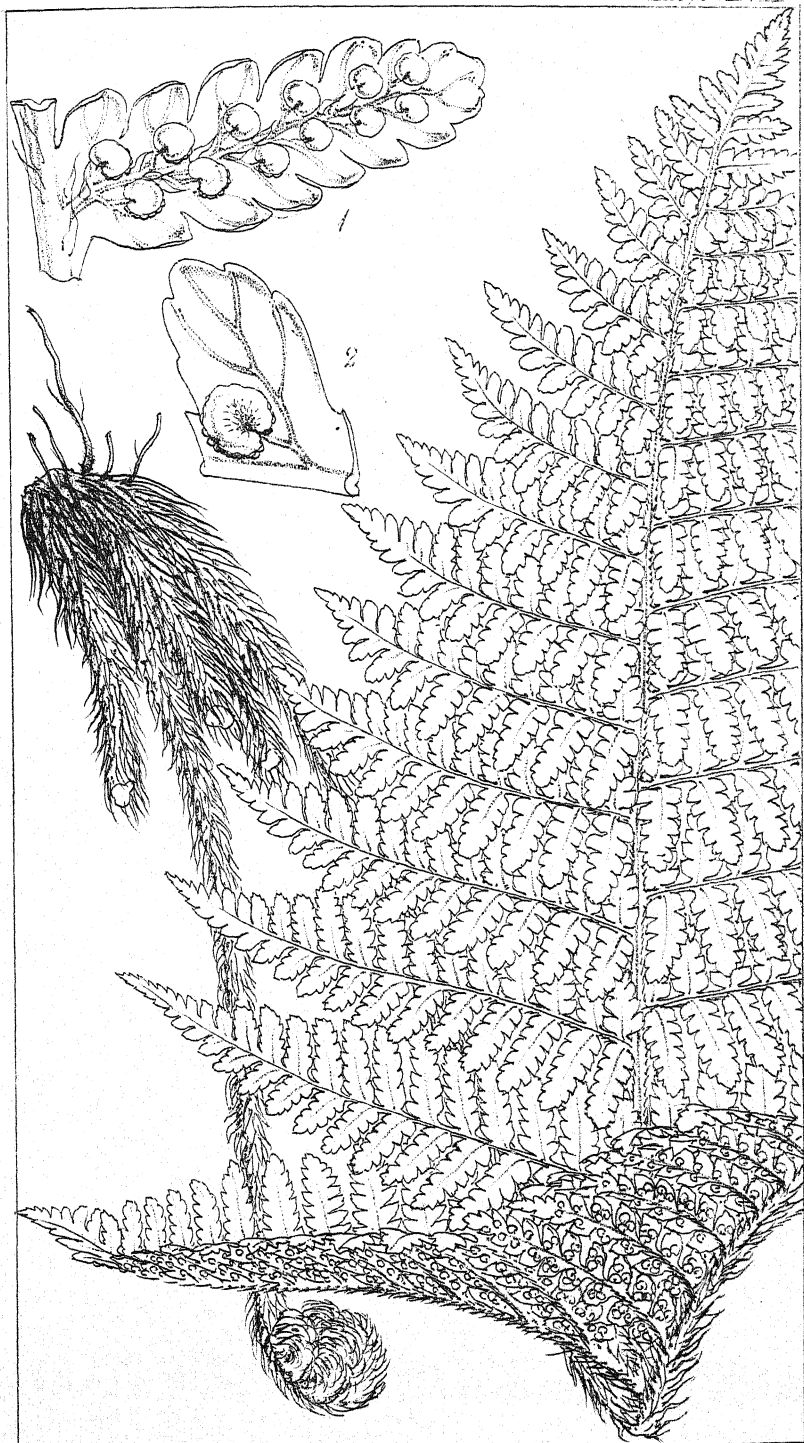


TAB. CCLVII.

NEPHRODium (LASTREA) ASCENSIONIS, *Hook.*—p. 124.

Base of stipites, undeveloped frond, and fertile frond; *nat. size.*

Fig. 1. Pinnule; *magnified.* Fig. 2. Segment of a pinnule, with sorus; *more highly magnified.*

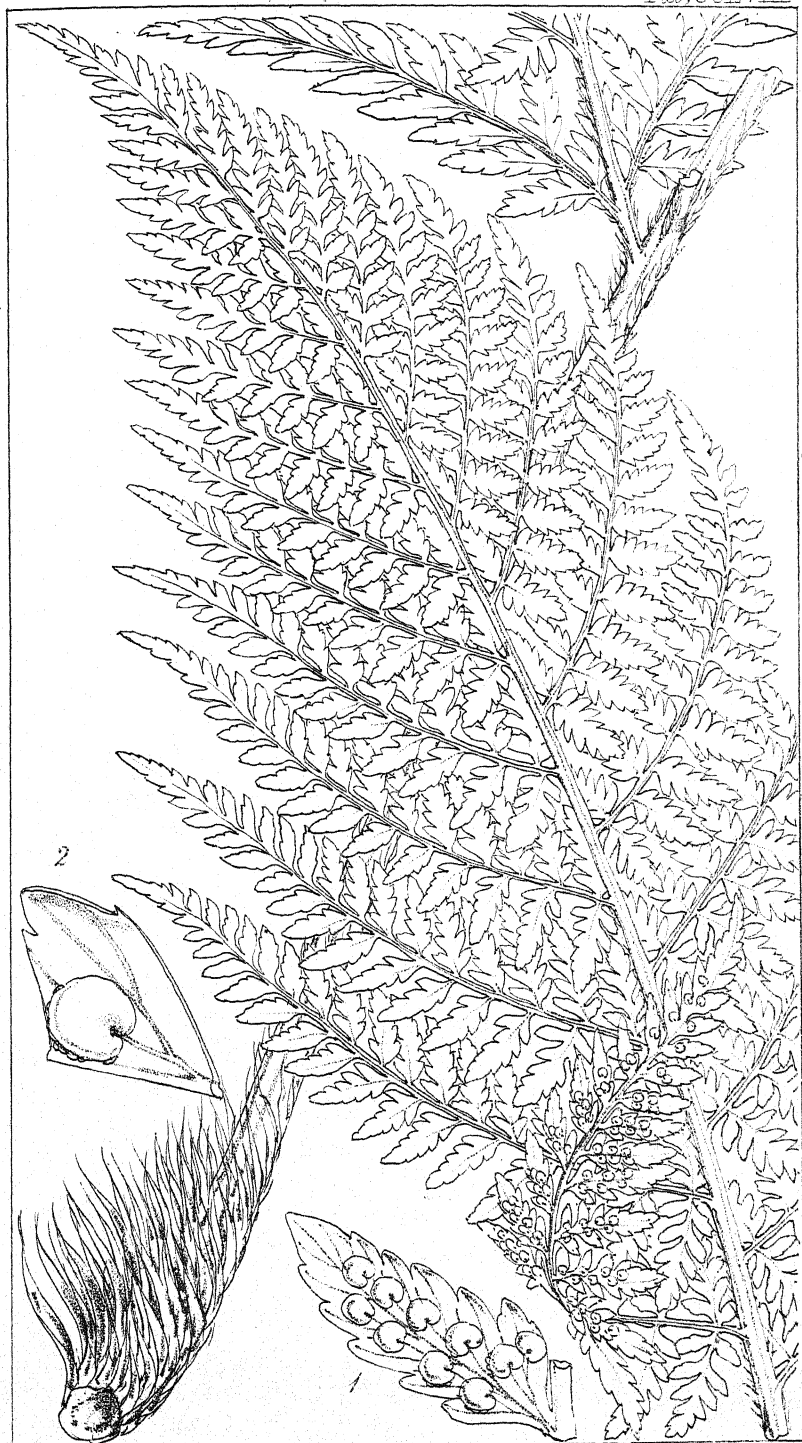




TAB. CCLVIII.

NEPHRODIUM (LASTREA) ATHAMANTICUM, *Hook.*—p. 125.

Stipes and portions of a fertile frond; *nat. size.* Fig. 1. Fertile pinna; *magnified.* Fig. 2. Portion of the same with involucre; *magnified.*

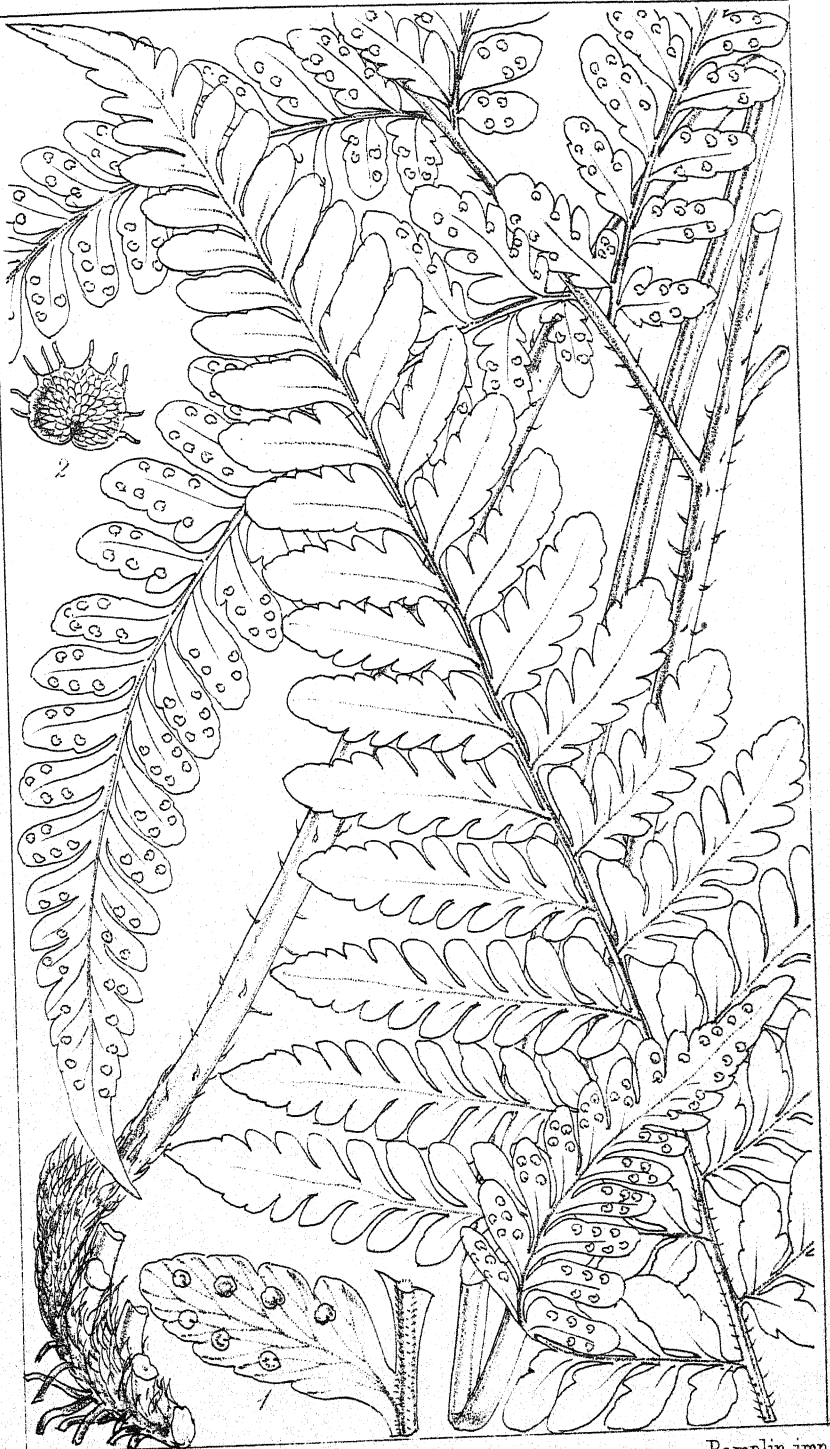


TAB. CCLIX.

NEPHRODIIUM (LASTREA) FUNESTUM, *Hook.*—p. 129.

Stipes, with portion of the caudex, and portions of a fertile frond; *nat. size.* Fig. 1. Fertile pinnule; *magnified.*

Fig. 2. Involucre; *more magnified.*

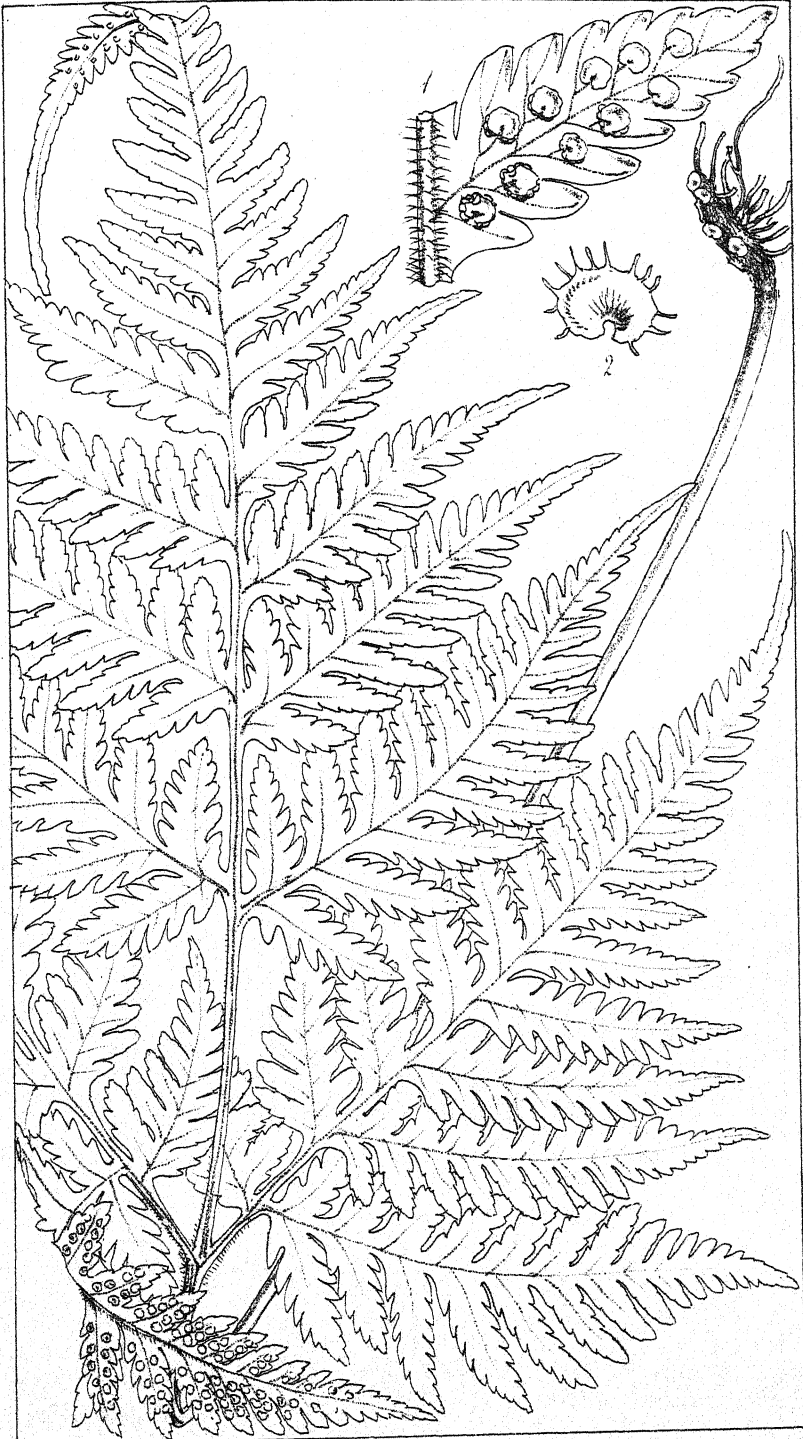


TAB. CCLX.

NEPHRODIUM (LASTREA) PARISHII, *Hook.*—p. 131.

Fertile frond; *nat. size.* Fig. 1. Fertile pinnule; *magnified.*

Fig. 2. Involucre; *more magnified.*

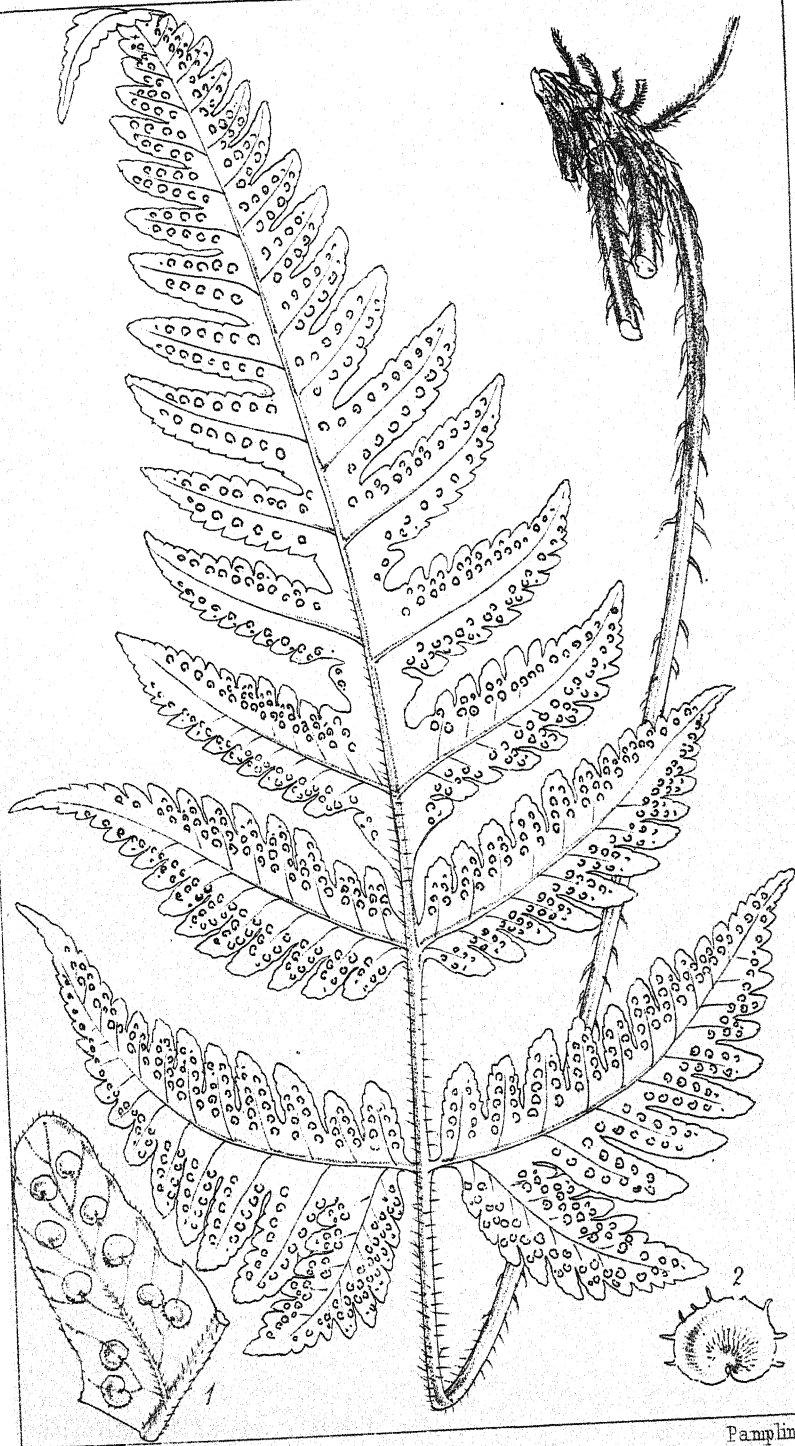


TAB. CCLXI.

NEPHRODium (LASTREA) MEMBRANIFOLIUM, Pr.—p. 131.

Fertile frond and portion of the caudex; *nat. size.* Fig. 1.

Fertile segment; *magnified.* Fig. 2. Involucre; *more magnified.*



Pamplin imp



TAB. CCLXII.

NEPHRODIUM (LASTREA) PURPURASCENS, Hook.—p. 132.

Stipes and fertile frond; *nat. size.* Fig. 1. Fertile pinnule;  
*magnified.* Fig. 2. Involucre; *more magnified.*



Fitch, del et lith.

Pamplin, imp

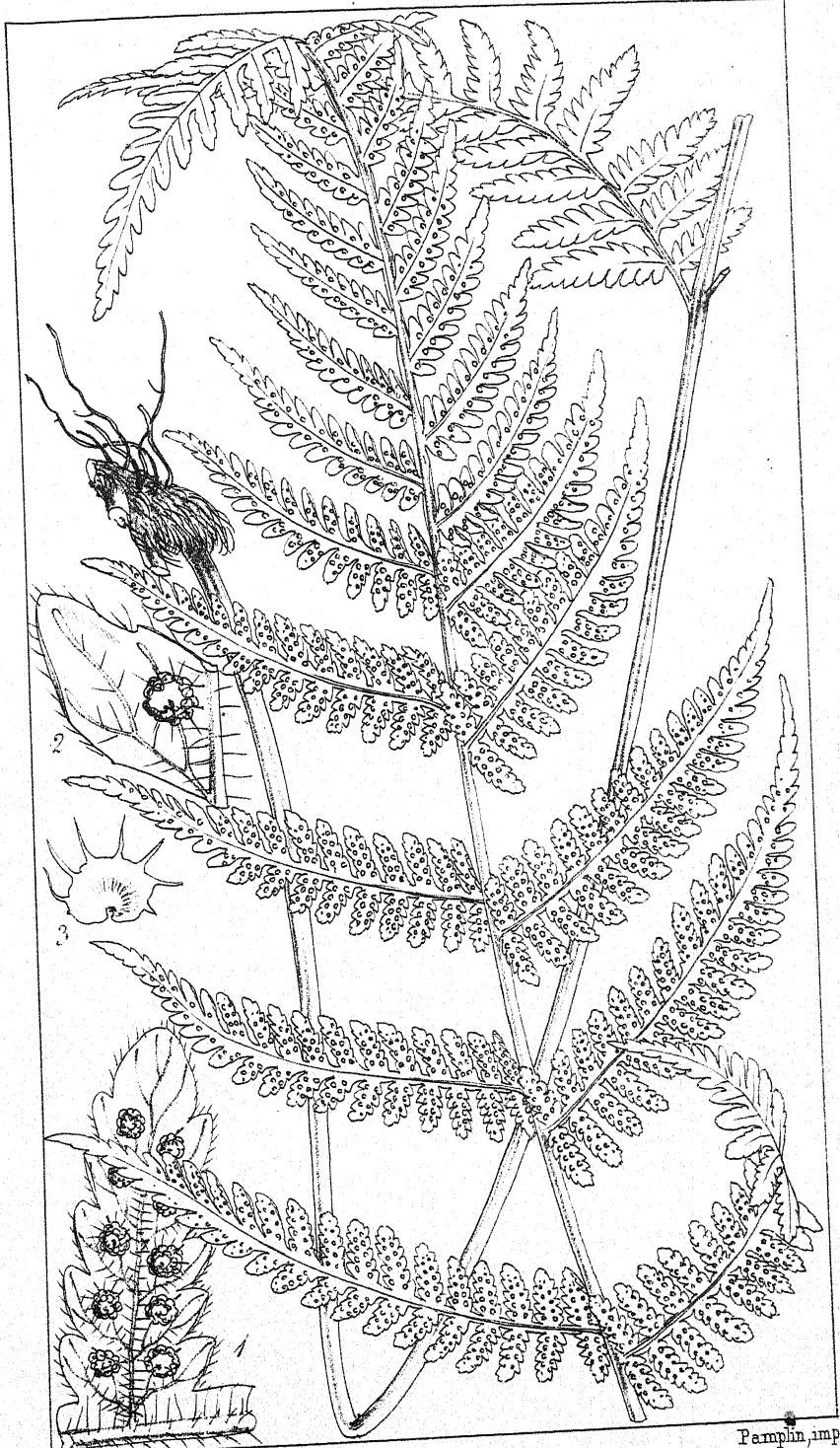
TAB. CCLXIII.

NEPHRODIIUM (LASTREA) FLACCIDUM, Hook.—p. 133.

Stipes, portion of a caudex, and fertile frond; *nat. size.* Fig. 1.

Fertile pinnule; *nat. size.* Fig. 2. Segment of a pinnule,  
with a sorus; *more magnified.* Fig. 3. Involucre; *still*

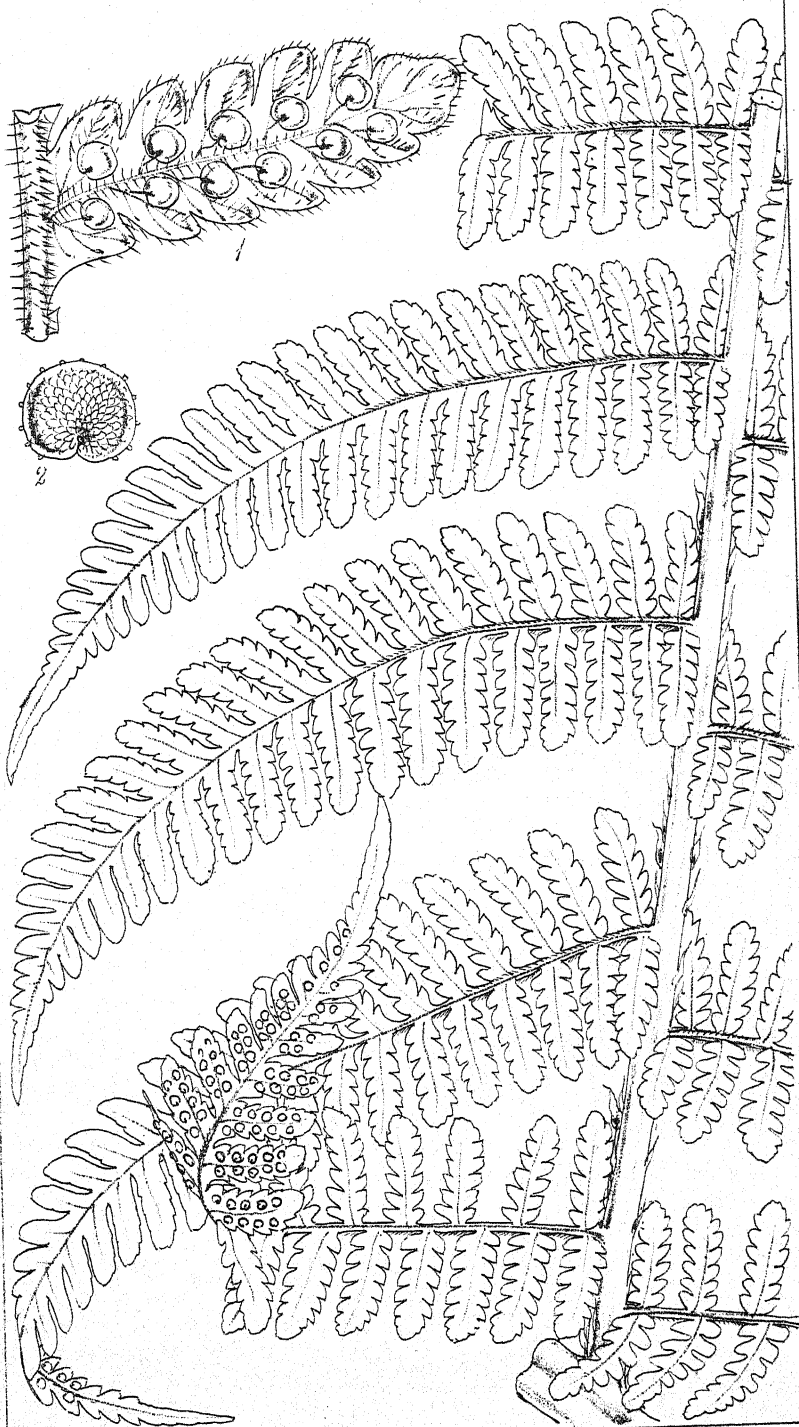
*more magnified.*



TAB. CCLXIV.

NEPHRODIIUM (LASTREA) VILLOSUM; *Hook.*—p. 134.

Portion of a fertile frond; *nat. size.* Fig. 1. Fertile pinna;  
*magnified.* Fig. 2. Involucre; *more magnified.*

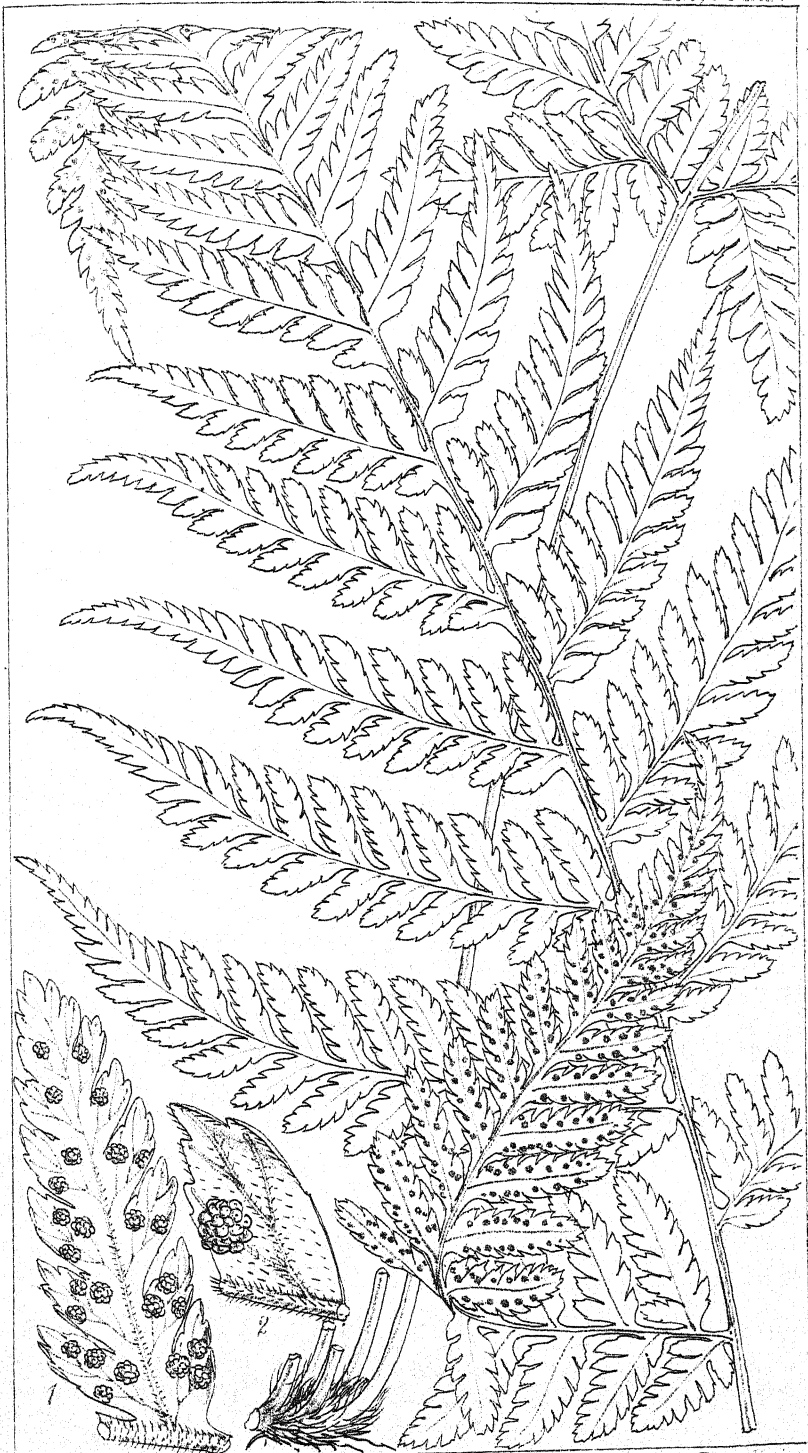


TAB. CCLXV.

NEPHRODIIUM (LASTREA) RECEDENS, *Hook.*—p. 135.

Fertile frond and small portion of a caudex ; *nat. size.* Fig. 1.

Fertile pinna ; *magnified.* Fig. 2. Fertile segment of a pinnule, with a sorus (wanting the involucre) ; *more magnified.*



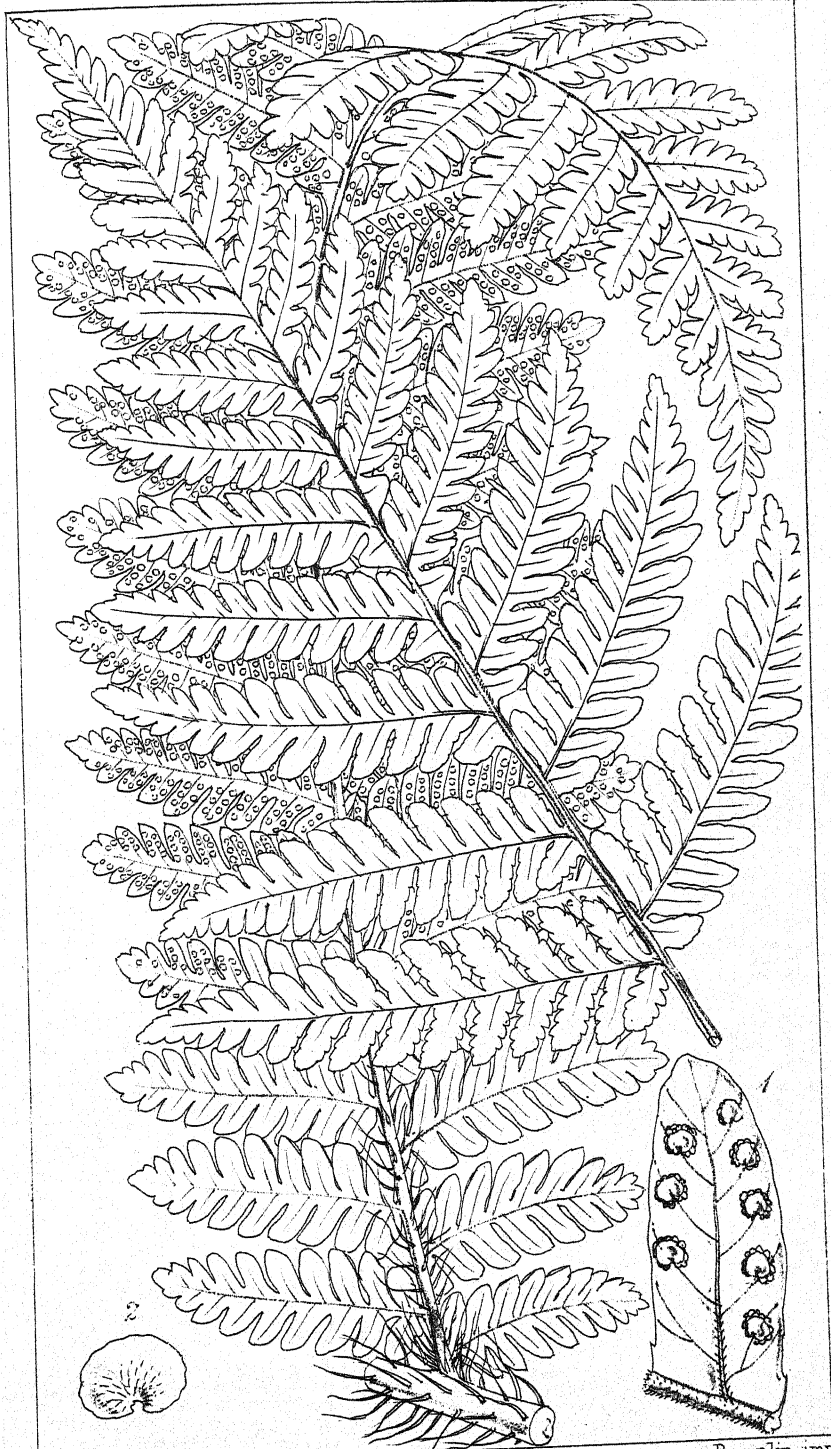


TAB. CCLXVI.

NEPHRODIIUM (LASTREA) OPPOSITUM, *Hook.*—p. 136.

Lower primary pinna, and the apex of a fertile frond; *nat. size.*

Fig. 1. Fertile segment; *magnified.* Fig. 2. Involucre;  
*more magnified.*



TAB. CCLXVII.

NEPHRODIIUM (LASTREA) MEXICANUM, *Hook.*—p. 138.

Fertile frond, and portion of a caudex; *nat. size.* Fig. 1.

Fertile pinna; *magnified.* Fig. 2. Involucre; *more magnified.*



Ritch del et lith.

Pamplin. sculp.

TAB. CCLXVIII.

NEPHRODium (LASTREA) SQUAMISSETUM, *Hook.*—p. 140.

Portion of a caudex, stipes, and fertile frond ; *nat. size.* Fig. 1.

Fertile pinnule ; *magnified.* Fig. 2. Fertile segment, with  
a sorus ; *more magnified.*





Fitch del, et lith.

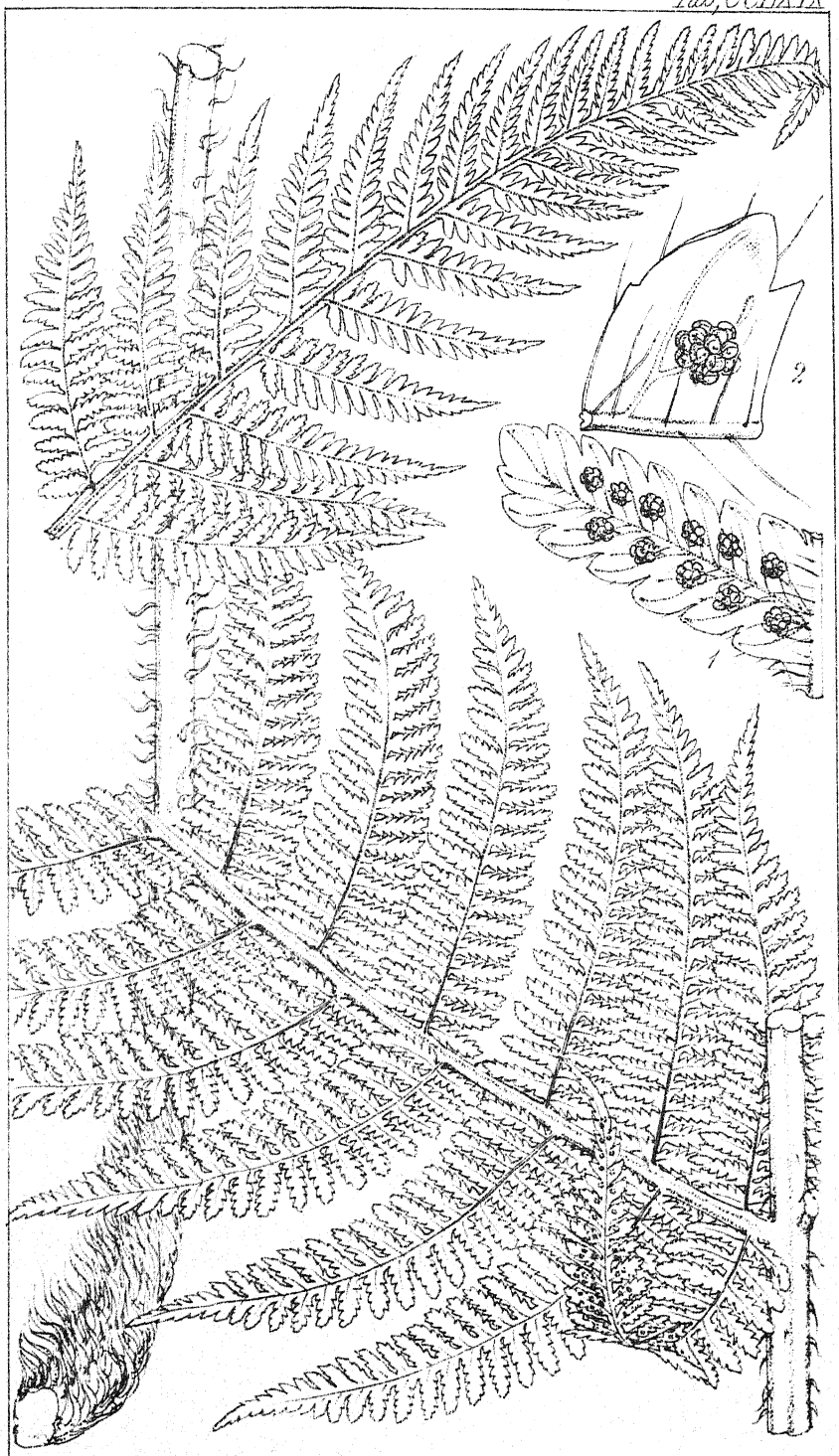
Pamplin, imp.

TAB. CCLXIX.

NEPHRODium (LASTREA) TENERICAULE, *Hook.*—p. 142.

Base of a stipes, and portions of a fertile frond; *nat. size.*

Fig. 1. Fertile pinnule; *magnified.* Fig. 2. Portion of a fertile pinna, with a sorus (the involucre obsolete); *more magnified.*



Fitch del et lith.

Pamplin. imp.

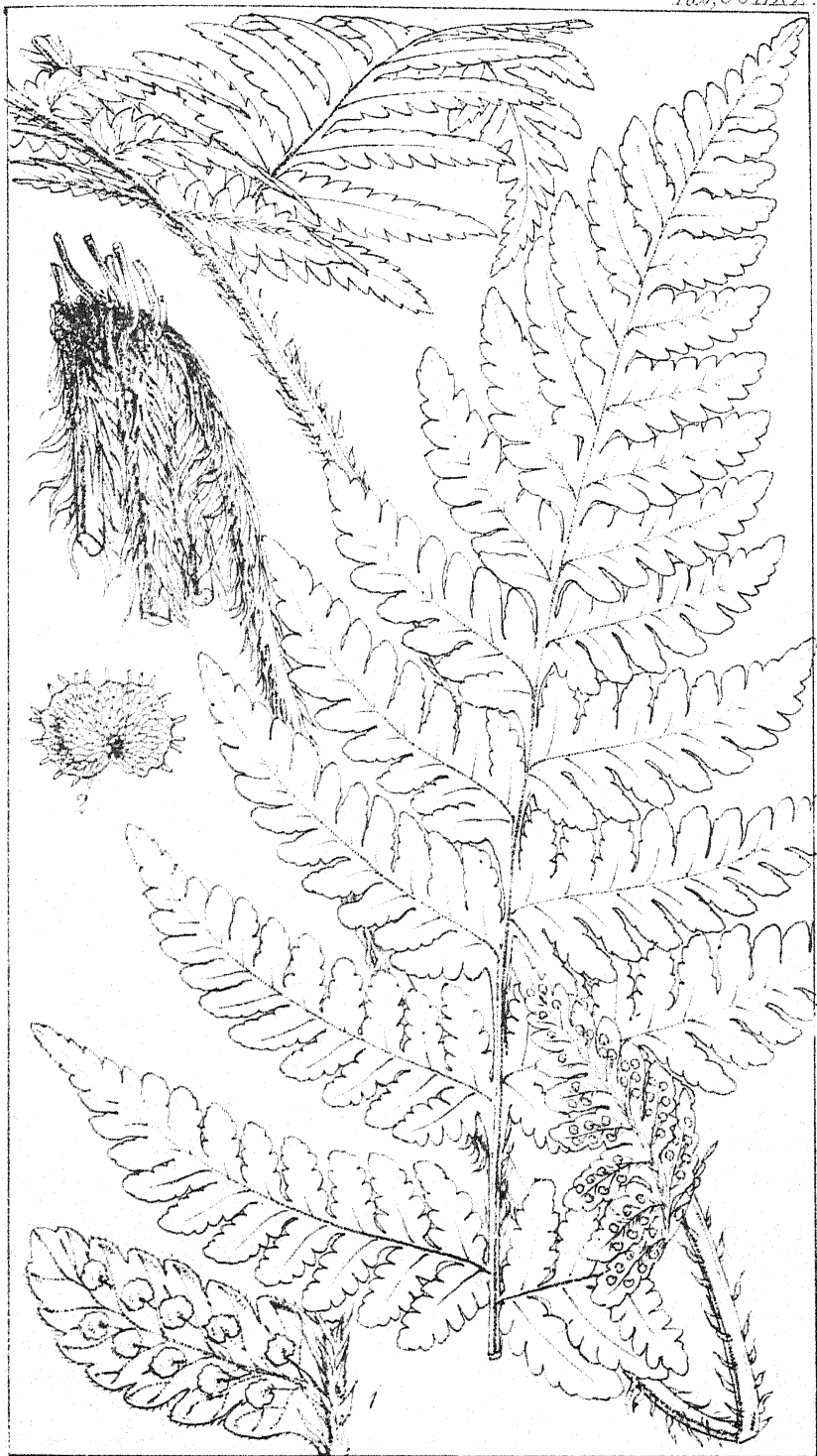


TAB. CCLXX.

NEPHRODIIUM (LASTREA) SQUAMIGERUM, *Hook. et Arn.*—p. 144.

Portion of a caudex, and a fertile frond; *nat. size.* Fig. 1.

Pinnule; *magnified.* Fig. 2. Involucre; *more magnified.*

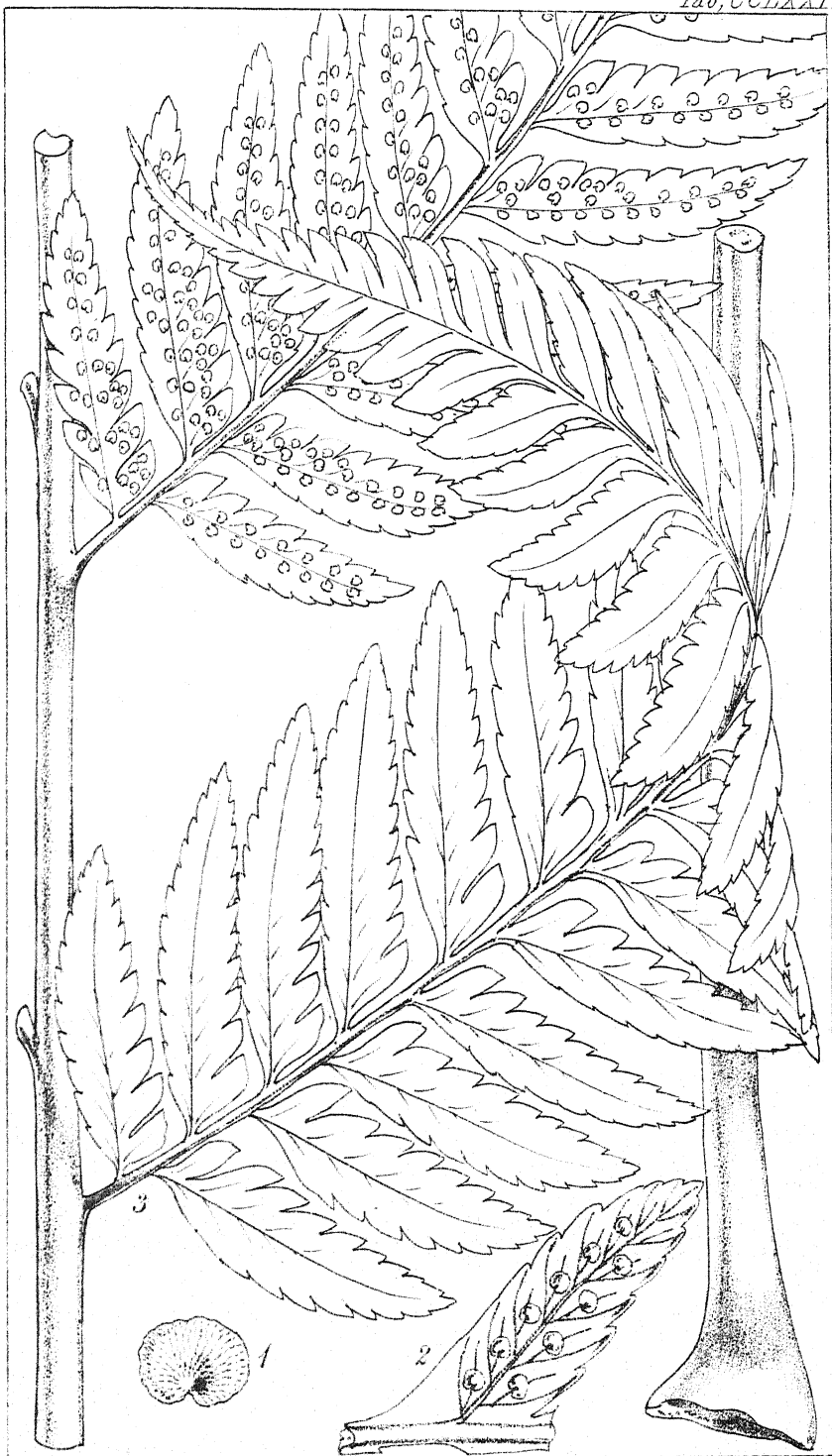


TAB. CCLXXI.

NEPHRODIUM (LASTREA) ACUTUM, *Hook.*—p. 147.

Base of a stipes, and (Fig. 3) a portion of the frond; *nat. size.*

Fig. 1. Involucre; *much magnified.* Fig. 2. Fertile segment of a pinna; *less magnified.*



ritch, del. et lith.

Pamplin, imp.



TAB. CCLXXII.

A. POLYPODIUM (EUPOLYPODIUM) SESSILIFOLIUM, *Hook.*—p. 168.

Fig. 1. Portion of a fertile frond; *magnified*. Fig. 2. Fertile fronds; *nat. size*.

B. POLYPODIUM (EUPOLYPODIUM) ZEYLANICUM, *Metten.*—p. 169.

Fig. 1. Portion of a fertile frond; *magnified*. Fig. 2. Fertile fronds; *nat. size*.



Fitch. del et lith.

Pamphn. imp.

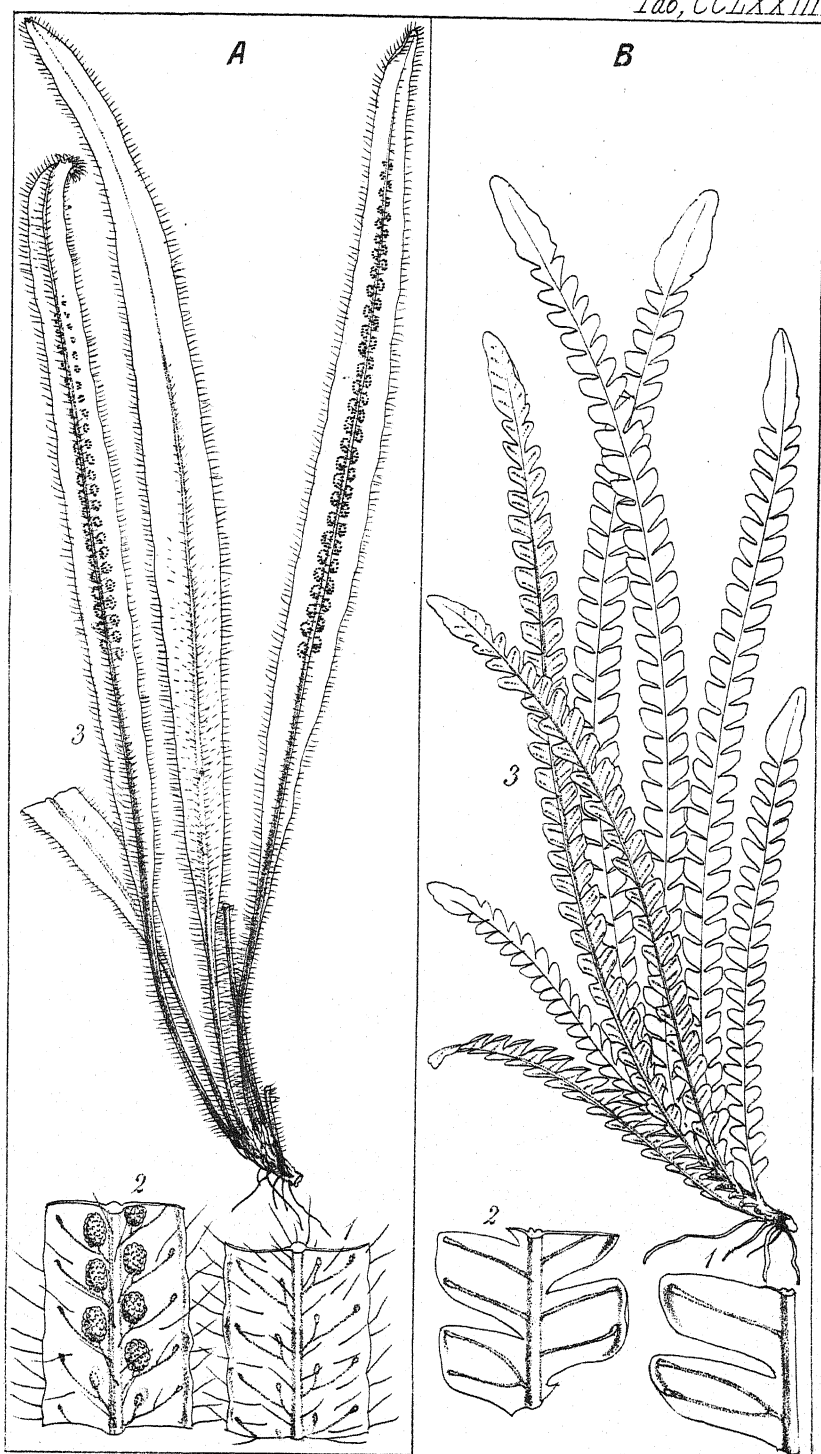
TAB. CCLXXIII.

A. POLYPODIUM (EUPOLYPODIUM) HIRTUM, *Hook.*—p. 170.

Fig. 1. Portion of a frond, upper side; and Fig. 2. Portion of a fertile frond, seen from beneath; *magnified*. Fig. 3. Fertile fronds; *nat. size*.

B. POLYPODIUM? (EUPOLYPODIUM) BINERVE, *Hook.*—p. 175.

Fig. 1. Segment, with a single vein; and Fig. 2. Segment, with two veins; *magnified*. Fig. 3. Sterile fronds; *nat. size*.



Fitch del et lith,

Pamplin imp.



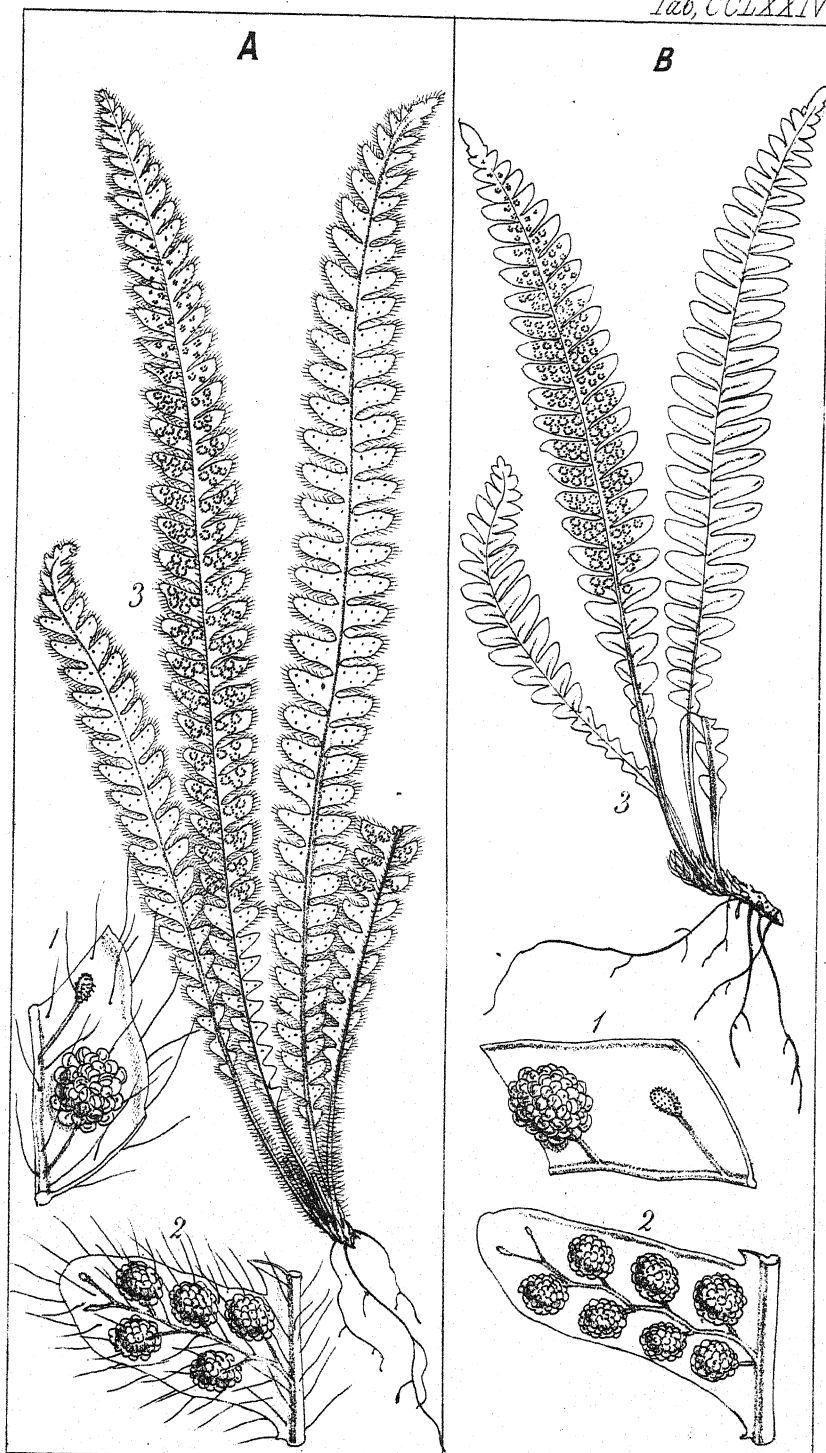
TAB. CCLXXIV.

A. POLYPODIUM (EUPOLYPODIUM) SUBSCABRUM, *Kl.*—p. 183.

Fig. 1. Portion of a fertile segment of a frond; *highly magnified*. Fig. 2. Fertile segment; *less highly magnified*. Fig. 3. Fertile fronds; *nat. size*.

B. POLYPODIUM (EUPOLYPODIUM) PARVULUM, *Bory.*—p. 184.

Fig. 1. Portion of a fertile segment; *highly magnified*. Fig. 2. Fertile segment; *less highly magnified*. Fig. 3. Sterile and fertile fronds; *nat. size*.



Fitch, del et lith.

Pamplin, imp.

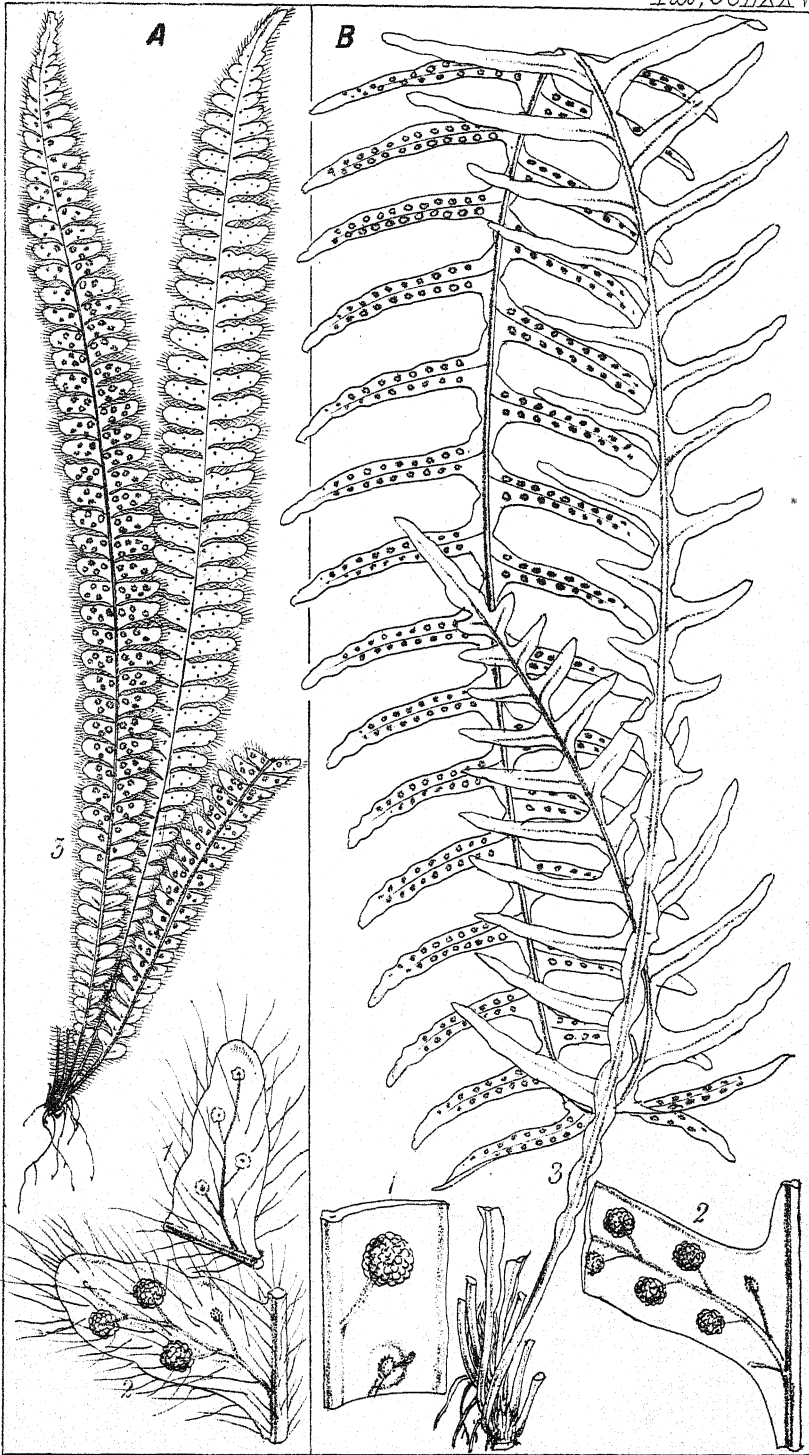
TAB. CCLXXV.

A. *POLYPODIUM*\* (*EUPOLYPODIUM*) *SUBTILE*, *Kze.*—p. 187.

Fig. 1. Fertile segment of a frond, from which the sori have been removed; and Fig. 2. Fertile segment, with sori; *magnified*. Fig. 3. Fertile fronds; *nat. size*.

B. *POLYPODIUM* (*EUPOLYPODIUM*) *PTEROPUS*, *Hook.*—p. 192.

Fig. 1. Portion of a fertile segment; *highly magnified*. Fig. 2. Portion of fertile segment; *less highly magnified*. Fig. 3. Fertile frond; *nat. size*.



Fitch, del et lith.

Pamplin, imp.



TAB. CCLXXVI.

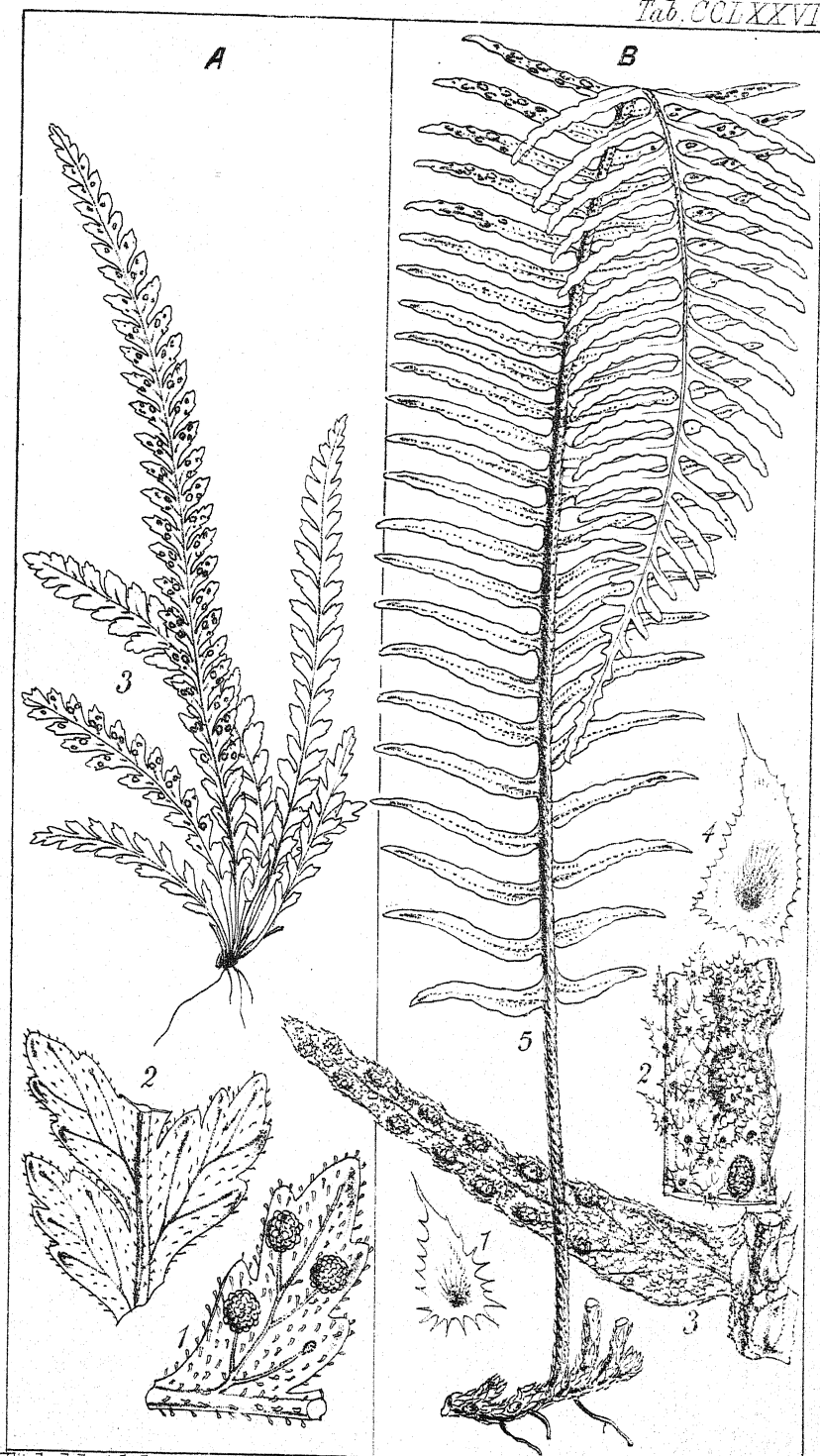
A. POLYPODIUM (EUPOLYPODIUM) GLANDULOSUM, Hook.—p. 193.

Fig. 1. Fertile segment, with sori; and Fig. 2. Sterile segments; *magnified*. Fig. 3. A tuft of fronds; *nat. size*.

B. POLYPODIUM (EUPOLYPODIUM) SKINNERI, Hook.—p. 215.\*

Fig. 2. Portion of a fertile pinna, with sori; *highly magnified*. Fig. 3. Fertile pinna; *less highly magnified*. Fig. 1 and 4. Scales from the frond; *highly magnified*. Fig. 5. Caudex and fertile frond; *nat. size*.

\* It is requested that "TAB. CCLXXXVI." at this page (215) may be corrected to TAB. CCLXXVI.



Fitch, del et lith.

Pampin. imp.

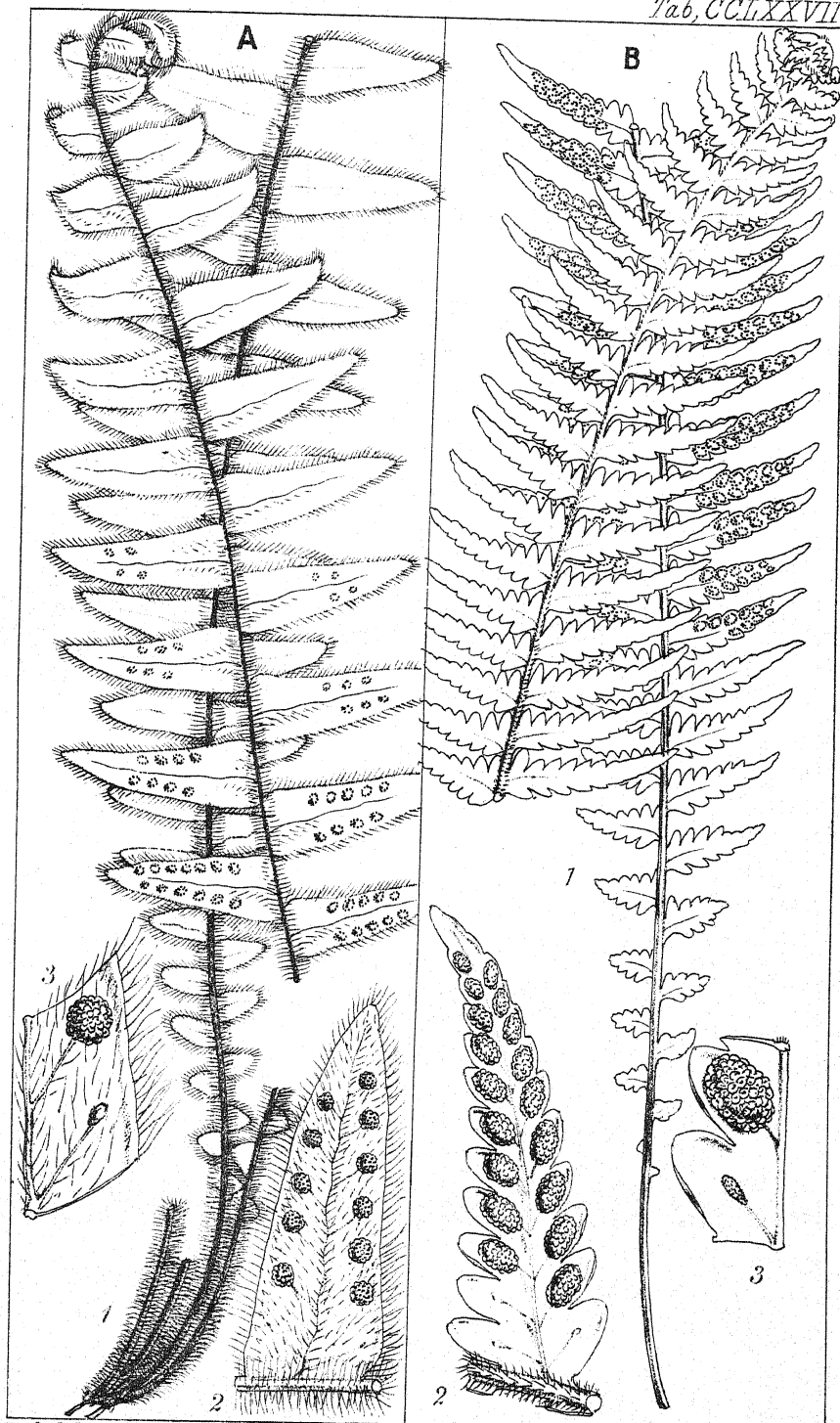
TAB. CCLXXVII.

A. POLYPODIUM (EUPOLYPODIUM) ALTERNIFOLIUM, *Hook.*—p. 222.

Fig. 1. Fertile frond; *nat. size.* Fig. 2. Fertile pinna; *magnified.* Fig. 3. Portion of a fertile pinna; *more highly magnified.*

B. POLYPODIUM (EUPOLYPODIUM) ATHYRIOIDES, *Hook.*—p. 224.

Fig. 1. Fertile frond; *nat. size.* Fig. 2. Fertile pinna; *magnified.* Fig. 3. Portion of a pinna, with a sorus, and the apex of sterile vein; *more magnified.*



Fitch del et lith.

Pamplin, imp.



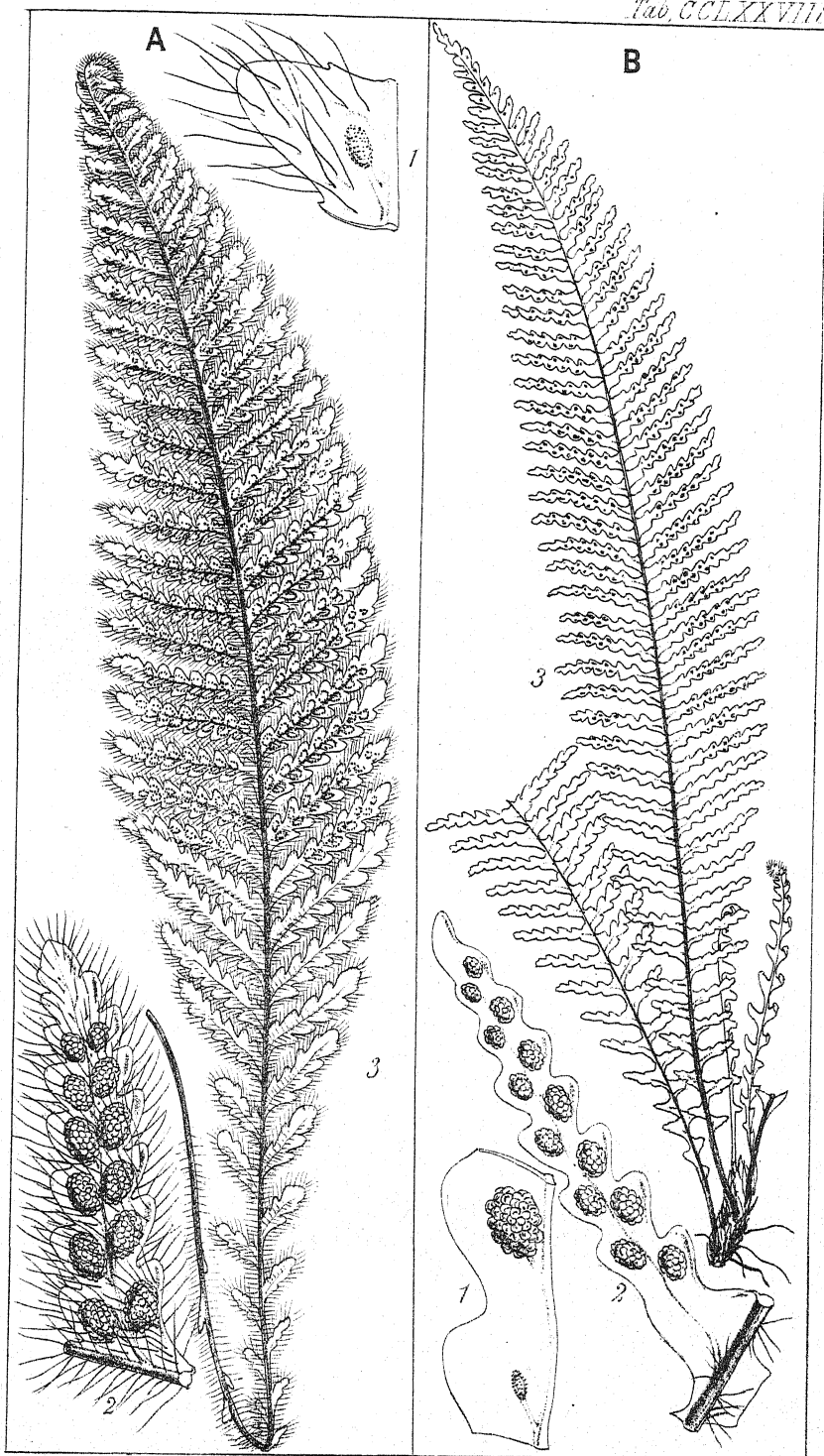
TAB. CCLXXXVIII.

A. POLYPODIUM (EUPOLYPODIUM) LONGISETOSUM, *Hook.*—p. 225.

Fig. 1. Portion of a fertile pinna, with the sorus removed, showing the vein; *highly magnified*. Fig. 2. Fertile pinna; *less highly magnified*. Fig. 3. Fertile frond; *nat. size*.

B. POLYPODIUM (EUPOLYPODIUM) LOBBIANUM, *Hook.*—p. 226.

Fig. 1. Portion of a fertile pinna, with one sorus removed; *highly magnified*. Fig. 2. Fertile pinna; *less highly magnified*. Fig. 3. Fertile frond; *nat. size*.



Fitch, del et lith.

Pamplin, imp.

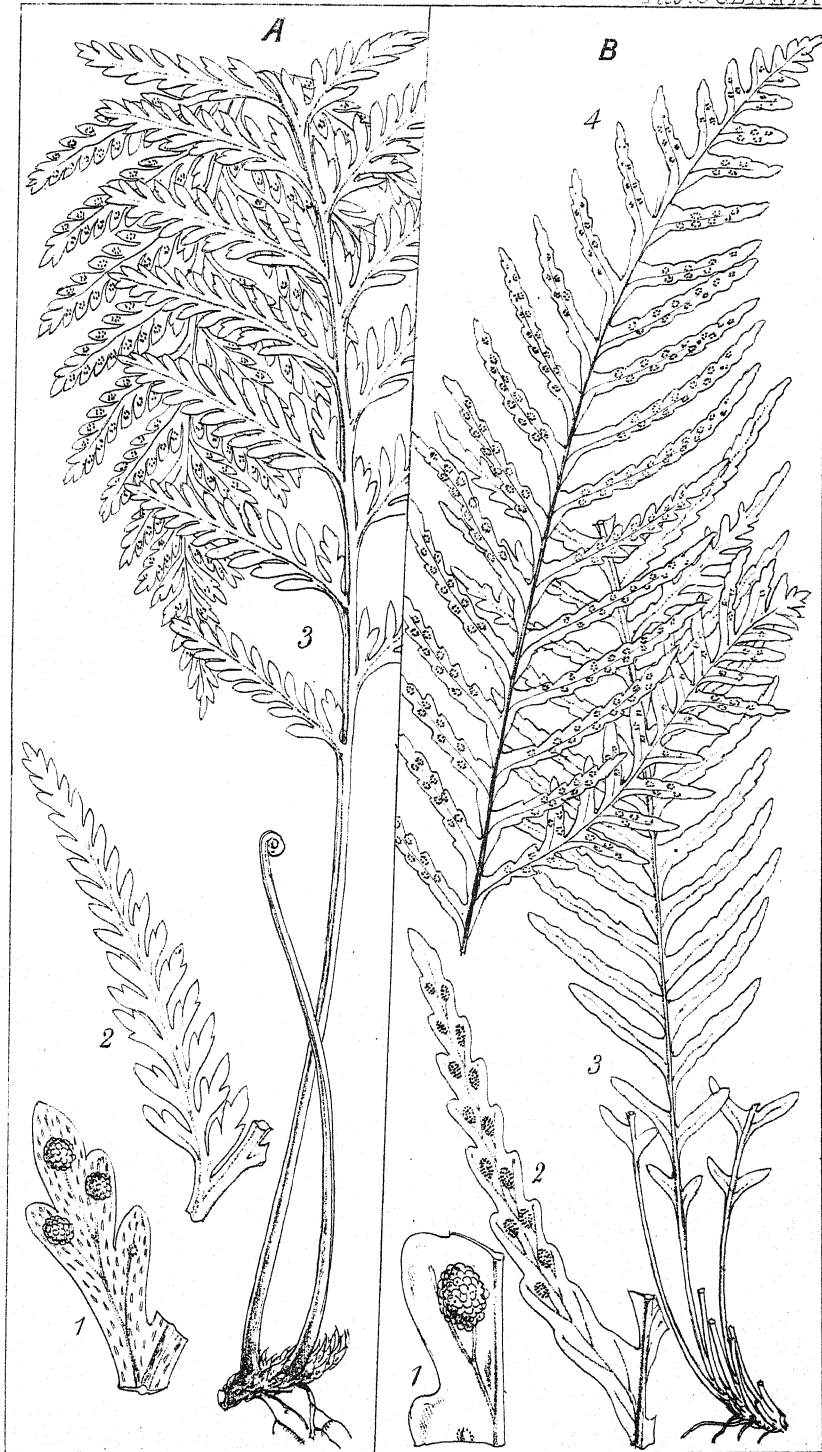
TAB. CCLXXIX.

A. POLYPODIUM (EUPOLYPODIUM) HILLEBRANDII, Hook.—p. 228.

Fig. 1. Ultimate fertile pinnatifid segment (or pinnule), with sori; *magnified*. Fig. 2. Primary compound segment or pinna; *slightly magnified*. Fig. 3. Frond, and portion of the caudex; *nat. size*.

B. POLYPODIUM (EUPOLYPODIUM) DECIPIENS, Hook.—p. 231.

Fig. 1. Fertile portion of a pinna; *much magnified*. Fig. 2. Fertile pinna; *less magnified*. Fig. 3 and 4. Fertile frond; *nat. size*.



Fitch del et lith.

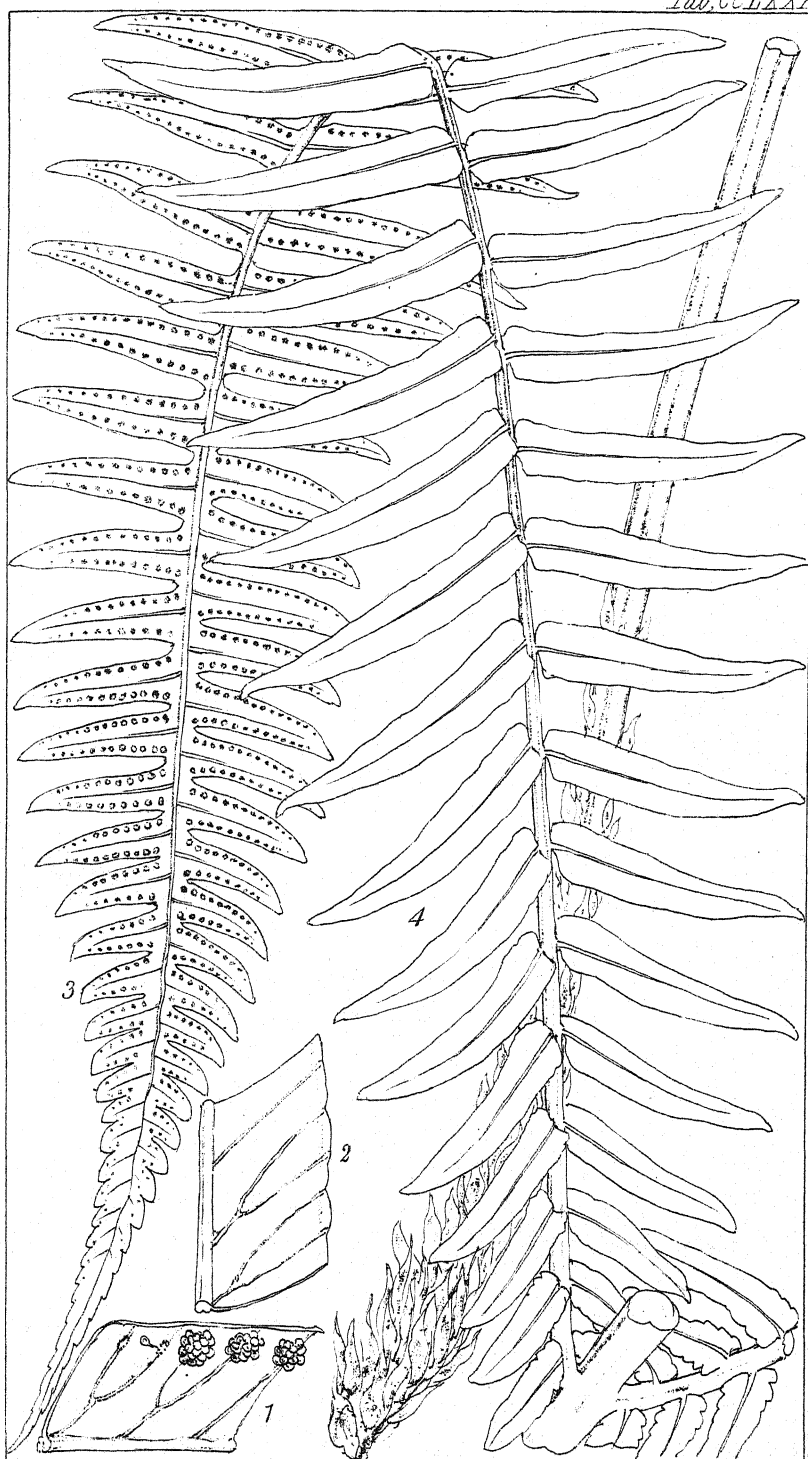
Pamplin, imp.



TAB. CCLXXX.

POLYPODIUM (PHEGopteris) PTEROIDEUM, *Kl.*—p. 255.

Fig. 1. Portion of a fertile pinnule; and Fig. 2. Portion of a sterile one (showing the venation); *magnified*. Fig. 3 and 4. Stipes, and small fertile portion of a large frond; *nat. size*.



Fitch, del et lith.

Pamplin, imp.